Petrochemical Industry
Task Force Report

FEBRUARY 1984

TASK FORCE MEMBERS

J.E. Akitt
President
Esso Chemical Canada

J.M. Hay
Chairman of the Board
Dow Chemical Canada Inc.

J.H. Dinsmore
President
Pétromont Inc.

W.N. Kissick
Chairman & Chief Executive Officer
Union Carbide Canada Limited

E.H. Drew
President & Chief Executive Officer
Celanese Canada Inc.

W.W. Schultz
President
Hercules Canada Inc.

R.S. Dudley
President & Chief Executive Officer
Polysar Limited
Chairman
Petrosar Limited

J.P. Sutherland
Executive Vice President
NOVACOR Chemicals Ltd.

R.O. Fisher
President
Ocelot Industries Ltd.

B.L. Turvolgyi
Senior Vice President,
Du Pont Canada Inc.

C.H. Hantho
President & Chief Executive Officer
C-I-L Inc.

TASK FORCE SECRETARY

J.M. Bélanger
President
Canadian Chemical Producers' Association

REPORT OF THE PETROCHEMICAL INDUSTRY TASK FORCE

EXECUTIVE SUMMARY

The Petrochemical Industry Task Force was established to assess future prospects for the Canadian petrochemical industry and to make recommendations on an appropriate policy environment for the industry. As a result of its deliberations, the Task Force concludes that both the oil and gas based segments of the petrochemical industry can be internationally competitive over the long term based on advantages existing in Canada, provided that the industry is able to obtain appropriate feedstocks at market related prices (as determined by negotiations between buyer and seller).

If such a market responsive environment is created in Canada, the industry will be able to utilize one of Canada's major advantages -- its large and growing surplus of natural gas -- to re-establish its competitiveness. This can lead to future growth and important social and economic contributions to the country. More specifically, actions in this regard would safeguard thousands of jobs, enhance the significant job creation potential of the industry, attract new investments to Canada, significantly increase the domestic markets for natural gas and its products, and increase the opportunity within Canada to upgrade resources and export manufactured goods.

Petrochemical manufacturing is a key industry that is already of importance to the Canadian economy. It represents 60% of total chemical manufacturing in Canada which, in turn, is Canada's fifth largest industry in terms of value of factory shipments. Although it was seriously affected by the recession in 1982, the Canadian petrochemical industry was still able to achieve sales in excess of $5 billion, exports of $1.7 billion, and a positive trade balance of $0.6 billion. The industry is also associated with nearly 200,000 jobs. It directly employs about 18,000 highly skilled workers and has provided work for about 20,000 construction workers in each of the

last five years. In addition, petrochemical manufacturing sustains about 50,000 jobs in associated upstream industries and services, and supplies essential materials and key technology to closely related downstream industries which employ in excess of 125,000 workers. Because of the innovative, technological nature of the petrochemical industry, the quality of the direct jobs in terms of interest, challenge, satisfaction, and remuneration is high in comparison with industry generally.

The petrochemical industry's future potential is based on a unique combination of advantages in Canada. Among these advantages are: relatively large, proven oil and gas reserves which provide the basis for the industry's feedstocks; modern and efficient petrochemical plants that are world competitive in scale and technology; a highly experienced and productive work force; international marketing expertise and distribution systems; advanced research and development capabilities that provide essential technical support to downstream domestic industries; and a reputation as a stable, reliable supplier.

It is important to note that commodity petrochemical production is moving to oil and gas rich countries. At the same time, less competitive capacities are being shut down by the traditional producers in Japan, Western Europe, and the U.S.A., in recognition of the feedstock advantage in the oil and gas rich countries. These capacity closures, along with the renewed growth in petrochemical markets that is now underway, will result in the need for additional capacity globally before the end of the decade. With its competitive strengths, the Canadian petrochemical industry has the potential to participate profitably in this growth and to attract up to $3 billion of this required new investment. However, since a lead time of five years is required to plan and build new petrochemical facilities, appropriate actions need to be taken promptly if Canada hopes to attract such new investment and reap the associated benefits. Therefore, a concerted and coordinated effort is required by both government and industry.

In this regard, the Task Force makes a range of recommendations encompassing such factors as transportation, research and development, capital costs, and international trade. However, by far the most crucial recommendations deal with the need to obtain market related prices for feedstocks.

Feedstocks are critical because they represent the largest element of cost to the Canadian petrochemical producer. During the 1970s, feedstock costs in Canada provided an advantage to the domestic industry. However, the Canadian industry lost its competitiveness in 1982 when the more market responsive system in the U.S. and elsewhere resulted in substantially falling feedstock prices at the same time as feedstock costs in Canada were rising due to regulated oil and gas prices. Therefore, the Task Force recommends that the prices of oil and gas in Canada be allowed to become market responsive. The implementation of a market responsive pricing system will require changes to resource taxation and the regulations affecting oil and gas pricing, supply and pipelines.

It is recognized that a totally market responsive system may take some time to achieve. However, because of the significant opportunity available and the competitive situation facing the industry in Canada, it is essential that actions be taken as soon as possible. To this end, the Task Force makes some interim recommendations that should remain in place until a market responsive system is implemented.

One interim recommendation is for an immediate cost reduction in the order of 15% on natural gas (as measured in Toronto) for industrial users in Canada. The Task Force believes that the resulting price would be closer to a price that would exist under a market responsive system.

The results of several economic impact studies commissioned by the Task Force show that Canadians would receive a significant net

benefit, well beyond that of the petrochemical industry alone, if this recommendation were implemented. In fact, the studies show that the resulting heightened economic activity and increased gas volumes (in what is already one of the major domestic gas markets) would more than offset the costs involved.

If appropriate actions are not taken on this recommendation, the gas-based segment of the petrochemical industry will consume less natural gas and will most likely not undertake any future expansion. Some parts of the industry may even decline.

The Task Force concludes that feedstocks based on crude oil will not likely be competitive in the intermediate term. In spite of this, the Task Force believes that the oil-based segment can re-establish its competitiveness by increasing its ability to use a wider range of feed stocks. In the near term, this involves the continuation of efforts to reduce its use of crude oil. Of particular importance in this regard will be the segment's ability to access competitively priced domestic supplies of propane and butane, which are co-products of natural gas production and surplus to Canada's needs.

To implement such an adjustment, the Task Force recommends that appropriate surplus tests be applied to propane and butane since large quantities of these products are currently being exported. In addition, the high up front fiscal burden on propane and butane destined for use in Canada should be reduced in order to provide more flexibility in determining competitive prices through commercial negotiation.

The petrochemical industry will continue to use lower value streams from refineries as alternate feedstocks to the maximum extent practicable. Using such feedstocks does not create additional crude oil consumption specifically for petrochemical needs and, in fact, upgrades these low value resources.

Increased feedstock flexibility will require considerable modification to existing plants and related infrastructure for the oil-based segment of the industry. Therefore, the Task Force recommends that a government-industry transition program be established to provide financial assistance to this segment for a period of up to three years.

This financial assistance for transition should be provided immediately so that the segment can sustain its operations while it undertakes the required studies and modifications to re-establish its long-term viability. Since the circumstances are different in each case, the details of the transition program will be negotiated separately by each company, and will involve a number of commitments by the companies in such areas as human resources and use of oil. The amount of this short-term assistance should be roughly equivalent to whatever unit cost decrease is initiated for gas, or approximately 15% of the feedstock and energy costs directly related to the production of petrochemicals (excluding aromatics). It should be provided in diminishing amounts as the conversion nears completion.

The Task Force recognizes that some petrochemical products can only be made from oil-based feedstocks. Therefore, it also recommends that regulated crude oil pricing policies in Canada not create a competitive disadvantage opposite the market responsive pricing of oil on the U.S. Gulf Coast.

The Task Force firmly believes that the above recommendations would allow the oil-based segment of the petrochemical industry to achieve long-term competitiveness. In addition, an economic impact study shows that if these recommendations are implemented, additional government revenues would be generated that would more than offset the assumed costs involved. Conversely, if appropriate actions are not

taken, the continued viability of this segment will be put in serious question and a significant number of jobs could be lost.

The recommendations for both the oil and gas segments of the industry impact on the competitive position of one segment relative to the other. As a result, action on recommendations for each segment should be coordinated as closely as possible.

Since access to international markets is also an important issue, the Task Force recommends that a concerted effort by industry and government be developed with our major trading partners to increase market access. In particular, efforts should focus on bilateral negotiations with the U.S., and the continued development of negotiations with Japan.

Given the acceptance and early implementation of all of these recommendations, and in particular those pertaining to feedstocks, the Task Force firmly believes that the petrochemical industry will continue to be a major contributor to a strong Canadian economy through continuing investment, job creation, increased export earnings, and the upgrading of resources in Canada.

TABLE OF CONTENTS

Page

1. THE INDUSTRY. 1

2. RATIONALE FOR THE CANADIAN PETROCHEMICAL INDUSTRY 6

3. MAJOR ISSUES AND RECOMMENDATIONS. 14

   (i) Access to Competitively Priced Feedstocks
   (ii) Access to International Markets
   (iii) Transportation
   (iv) Technology
   (v) Capital Costs

4. ECONOMIC IMPACT OF TASK FORCE RECOMMENDATIONS 35

5. CONCLUSIONS 41

APPENDICES

A. BACKGROUND

   (1) Terms of Reference for the Petrochemical Industry Task Force
   (2) Representations Received by the Task Force

B. THE CANADIAN PETROCHEMICAL INDUSTRY

   (1) Industry Data
   (2) Description of the Industry
   (3) Key Industry Report
   (4) Responsible Care & Guiding Principles of the Industry
   (5) Major Petrochemical Producers, and their Products and Plant Locations
   (6) Examples of Industry Initiatives Taken

C. ENERGY RESERVES IN CANADA, THE U.S., AND WESTERN EUROPE

D. INTERNATIONAL ENVIRONMENT

   (1) Incentives Offered by Oil and Gas Rich Nations to Attract Petrochemical Investments
   (2) West European Ethylene Capacity
   (3) Evolving Supply/Demand Situation for Ethylene, Ammonia, and Methanol

E. REPORT OF THE TRANSPORTATION SUBCOMMITTEE

1. THE INDUSTRY

A Key and Responsible Industry of Importance to Canada

Chemical manufacturing is a key and responsible industry that is of great importance to the Canadian economy and that has the potential for further growth. The industry supplies vital materials and technology to nearly all other domestic industries. It has been one of Canada's leading manufacturing industries in terms of investment in new plant and equipment over the past five years. It has also made more energy efficiency improvements over this time than any other industry. The chemical manufacturing industry ranks second only to the pulp and paper industry in terms of value added by manufacture, and second only to the electrical and electronic products industry in terms of the percentage of the work force that consists of scientists and engineers engaged in research and development activities. Also, it is the country's fifth largest industry in terms of the value of factory shipments, preceded only by petroleum refining, pulp and paper, motor vehicle manufacturing, and meat and poultry products.

The petrochemical industry makes up over 60% of the chemical manufacturing industry in Canada and is very closely interrelated with the other segments of this industry. Like other manufacturing sectors, the petrochemical industry did not escape the effects of the economic decline in 1982. Nevertheless, the petrochemical industry was still able to achieve sales in excess of $5 billion, exports of $1.7 billion, value added through manufacturing of $1.7 billion, a positive trade balance amounting to $0.6 billion, and an investment level that has been over $1 billion per year for the past few years. The industry was also able to provide a relatively stable employment environment for its work force. (Appendix B-1 and B-2 provide a more detailed description of the industry.)

It should be pointed out that the petrochemical industry is also a major contributor to the achievement of many of the important goals and objectives for Canada that are being pursued by government in such areas as resource upgrading, export trade, investment, employment, safety, and research and development.

The Task Force firmly believes that the petrochemical industry can play a major role in fostering Canada's economic development because it is:

(1) a dynamic industry, viable in the long term, with the potential for market growth and investments that will produce significant and rising levels of employment and incomes for Canadians;
(2) an integral component of the nation's economic structure;
(3) a significant, progressive employer;
(4) a socially responsible industry;
(5) an industry that maximizes the benefit to Canadians derived from the natural resources entrusted to it; and
(6) an industry that develops and/or acquires new technology and new products and adapts them to Canadian conditions.

These attributes are more fully described in Appendix B-3. However, the Task Force would like to highlight two of them.

The first is its role as a significant and progressive employer. The Canadian petrochemical industry:

- directly employs about 18,000;

- has employed an estimated 20,000 construction workers per year on average over the past five years; and

- employs on an on-going basis about 4,000 contract maintenance workers per year.

Based on Statistics Canada's input/output model, petrochemical manufacturing sustains about 50,000 jobs in associated upstream industries. In addition, the petrochemical industry supplies essential materials and key technology to closely related downstream industries which employ in excess of 125,000 workers.

Because of the innovative, technological nature of the petrochemical industry, the quality of the direct jobs in terms of interest, challenge, satisfaction, and remuneration is high in comparison with industry generally.

The industry's labour relations record clearly demonstrates the fact that job satisfaction and morale are high. The employees, unions, and management co-operate in a healthy environment, and time lost due to labour disputes is only about 20% of the manufacturing average. Much of the high morale can be attributed to a variety of joint employee-management programs that have now been widely adopted by the industry, such as the Quality of Working Life programs, that provide for greater worker input into the decision-making process.

The petrochemical industry is also one of the top performers in accident prevention in Canadian industry. The activities of the large number of employee-employer health and safety committees have contributed to this enviable record. The Industrial Accident Prevention Association, which publishes safety figures for Ontario, shows that the chemical and petroleum industries' accident rate has been 60% less than the average for all industry in the 10 years from 1973 to 1982.

In occupational health, programs and standards of the petrochemical industry have been self-developed, and often have been implemented well ahead of legislation and occupational health initiatives in other industries. Comprehensive programs that meet or exceed federal and provincial legislation have been in place since at least the mid-1970s and, in some parts of the industry, since the late 1960s. Examples of the industry's progressive record in this field include: the provision of high-quality medical consultant services for many years prior to specific medical and occupational health legislation; the development of programs dealing with the full range of emotional stresses in and beyond the workplace; and the leadership in developing positive employee approaches to fitness, nutrition, and lifestyle as part of an all-around health maintenance program.

The second attribute the Task Force would like to highlight deals with social responsibility.

The industry has undergone significant technological change over the past decade. In spite of the unavoidable dislocations in jobs and assignments that this has caused, there have been virtually no traumatic confrontations between management and employees. In most cases, dislocated employees have been retrained for other jobs within the industry. The consultative mechanism for dealing with technological change was first introduced in the mid-1960s. In fact, the mechanism became a model both for other industries facing technological change for the first time and for government legislation dealing with plant closures. In this regard, the industry generally supports government initiatives to improve manpower planning and forecasting mechanisms which assist in sourcing, job retraining, and relocation programs.

Canadian petrochemical manufacturers are constantly striving to further the responsible development, manufacture, transportation, storage, and ultimate disposal of chemicals to minimize the possibility of adverse effects on human health and well-being, and the environment. Appendix B-4 contains a statement on responsible care that each industrial member of the Task Force and other members of the industry have pledged to uphold.

One concrete example of the industry's commitment to the safe handling of chemicals is the Transportation Emergency Assistance Plan (TEAP). TEAP was initiated by the industry in 1971, again well ahead of any regulatory requirement. The current TEAP network spans the country and involves ten strategically located, regional centres along major transport arteries. In an emergency, fully trained and equipped industry specialists are dispatched to provide police, fire, and other emergency forces with professional, on-site assistance.

In summary, the Task Force believes that the petrochemical industry is a responsible manufacturer that has significantly contributed to

Canada's economic development in the past, and that it will continue to do so in a responsible manner in the future.

Products

For the purposes of the Task Force's work, the products considered to be part of the petrochemical industry include: ethylene, propylene, methanol, butadiene, butylenes, aromatics (benzene, toluene, xylenes), ammonia, and the principal derivatives of these products. Further information on Canada's major petrochemical producers, their products, and their plant locations is contained in Appendix B-5.

It should be pointed out that petrochemicals are an essential component of an industrialized nation. In fact, there is a growing reliance on man-made products based on petrochemicals in today's society for a number of reasons, including:

- they can be used by other industries to improve their products and production processes, thus fostering growth and innovation;

- they can replace our limited and increasingly scarce supplies of natural materials in meeting today's product demands;

- they can be superior to existing products in terms of their strength to weight ratio, corrosion resistance, etc.;

- they can be less expensive to produce, more hygienic, and use less energy to make; and

- they can be used for vital purposes for which there is no other natural product replacement.

2. RATIONALE FOR THE CANADIAN PETROCHEMICAL INDUSTRY

To justify its existence in Canada, the petrochemical industry must be viable in the long term. This means it has to be able to successfully compete in its own domestic markets and in a sizeable portion of international markets. The Task Force firmly believes that this is possible because Canada has a number of fundamental strengths that can contribute to the competitive position of the industry. Canada can use these strengths to take advantage of opportunities that are emerging internationally in petrochemical markets. This section of the Report will focus on these strengths and opportunities and describe how the potential of the industry can be achieved.

Industry Strengths

The fundamental strengths that can help position the Canadian petrochemical industry to realize its potential have been identified as follows:

a) Abundant Energy Resources

Canada is well endowed with energy resources. While abundant energy supplies are important to all manufacturers, oil and gas are doubly important to the petrochemical industry. This is because these resources are used not only as fuels to run petrochemical plants, but also provide the source of raw materials for the industry. (Within the industry, these raw materials are called feedstocks.)

Canada has a real advantage in terms of its energy resource position relative to virtually all other Western industrialized nations, and particularly in natural gas. In fact, one 1982 study showed that Canada had 58 years of proven natural gas reserves left, based on 1982 consumption rates, compared with 11 years in the U.S., and 23 years in Western Europe. For oil, the projections

were more than 12 years for Canada as opposed to less than seven years in the U.S., and five years in Western Europe. (See Appendix C.) Japan has no significant reserves of either oil or gas. It must also be pointed out that new discoveries are currently being made in areas such as eastern and northern Canada, which can further enhance Canada's position.

b) **A Highly Skilled, Efficient Work Force**

The petrochemical industry's work force in Canada has developed over the years into a highly skilled and productive comparative advantage. It will take developing nations that are beginning to compete in the industry many years to develop the educational institutions, in-house training programs, and high caliber of fully trained and experienced petrochemical workers that Canada now enjoys.

c) **Modern, Efficient Production Facilities**

Another strength is that the Canadian petrochemical industry has modern plants, that are world-competitive in scale and technology.

Over 60% of the petrochemical industry's investment in this country is less than five years old. When plants and production units have no longer been able to provide competitive quality and cost, they have been closed. (See Appendix B-6.) Between 1976-1982, eight new production units or plants were constructed to replace the older, less competitive units. In addition, modifications in the order of $250 million per year are continuing to be made to petrochemical facilities to add improved technology, to lower production costs, to improve safety, to enhance environmental controls, and to conserve energy. At the end of 1983, the petrochemical industry had investments in place amounting to $10.5 billion, an increase of

over $6 billion since 1978. In total, these petrochemical investments represented almost 20% of all industrial contracting done in Canada during this period.

These statistics demonstrate that the petrochemical industry is working to keep its facilities modern and efficient to maintain its world competitive position.

d) **International Marketing Skills**

Over the years the companies involved in Canada's petrochemical industry have built up effective distribution systems and proven international marketing skills. In 1982, the industry exported products valued at $1.7 billion to some 70 foreign countries.

e) **Stable and Reliable Supplier**

Even when the developing countries rich in oil and gas enter the worldwide petrochemical marketplace in a significant way, Canada will have an advantage in being regarded as a secure, diversified source of supply to other countries. Canada's reputation as having a stable and reliable business environment is certainly a large advantage in terms of international marketing. This reputation is based on Canada's historic political stability as well as the advanced state of its overall infrastructure, including transportation, communications, financial institutions, education, etc.

f) **Developed Industrial Base**

Compared to the developing countries entering the industry, Canada has a well-developed industrial base that provides a substantial, sophisticated, and growing market for petrochemical products. This provides the Canadian industry with a strong base of operations from which to build its export business.

The Task Force recognizes that there are also some disadvantages associated with the Canadian petrochemical industry. Some are structural, long-standing problems, such as the costs associated with transportation and construction. However, the issue of more immediate concern is the erosion of the price competitiveness of Canadian feedstocks.(These factors are discussed in the Major Issues and Recommendations section of the Report.) However, the Task Force believes that industry and government can maximize the impact of the inherent advantages and offset the impact of the disadvantages so that Canada can exploit the significant opportunities presented by the worldwide restructuring of the industry that is currently taking place.

Canadian Opportunities in the International Environment

a) History

Historically, the three major petrochemical producing areas in the world were the U.S.A., Western Europe, and Japan. Most manufacturing capacity was built in these areas because of their huge domestic markets and because feedstocks were low cost and easily available. With this strong domestic base, the three major manufacturing areas supplied not only their own domestic needs, but also accounted for almost all world trade of petrochemical products.

The industry experienced very high growth rates in the 1960s and 1970s, largely due to low cost feedstocks, rapid technology change, relatively high economic growth rates, and the substitution of traditional materials with new petrochemical-based products.

Then the OPEC crisis in the early 1970s, along with the subsequent succession of erratic oil price increases, caused the impact of feedstock costs in the major market areas to more than double to broadly range from 50% - 70% of the full factory cost of primary petrochemical products. Therefore, feedstock costs became the dominant factor in the economics and competitiveness of the industry.

Driven by political, economic, and social forces, many less-developed, oil and gas rich countries viewed the changes in the 1970s as an opportunity to develop a petrochemical industry in order to push industrialization, increase the value of their energy resources prior to export, and dramatically improve standards of living. Many of these countries offered incentives to attract the capital investment and skills required to achieve their goals. (See Appendix D-1.) The incentives offered by these oil and gas rich countries offset much of the perceived risk of doing business there and, as a result, have attracted foreign investment in new petrochemical production facilities.

An attractive energy and feedstock environment also existed in Canada in the 1970s. New investments therefore, were made in the Canadian petrochemical industry, based on the perception that this feedstock advantage would continue. During this time, the level of petrochemical investment in Canada was as high as, if not higher than, anywhere else in the world.

New facilities were built in the traditional petrochemical producing countries and the oil and gas rich countries (including Canada) to satisfy anticipated market demands. Due to world economic conditions, the industry now realizes that these growth expectations will not be met. This has resulted in a very serious overcapacity problem for the industry worldwide.

b) Capacity Reductions in the Major Market Areas

Overcapacity in the global industry has resulted in particularly severe competition and major financial losses. Therefore, many of the old, outdated, and less efficient facilities in traditional producing areas have been permanently or temporarily closed.

In the U.S.A., petrochemical plants are being closed under pressure from market forces. For example, about 20% of its ethylene capacity and 25% of its ammonia capacity have already been closed.

With the changing energy situation, Japan has recognized the serious difficulties of maintaining a competitive petrochemical industry based totally on imported oil-based feedstocks. Therefore, Japan has decided to reduce its production of primary petrochemicals. This can best be illustrated by the decision to eliminate one-third of its ethylene capacity. However, the government did recognize the strategic importance of the petrochemical industry to the nation's other manufacturing industries and, therefore, sought to maintain enough capacity to supply a major part of domestic demand. Japan has acknowledged that it will no longer be a major petrochemical exporter, but rather a significant petrochemical importer.

Due to the lack of feedstocks in Western Europe, many older, inefficient plants have been closed, and arrangements have been made to exchange or merge facilities in order to cut capacity. Close to 20% of the ethylene capacity has already been shut down. (See Appendix D-2.)

c) **Opportunity for the Canadian Petrochemical Industry**

The global petrochemical industry is now in a more mature stage, with much of the product substitution and easy market penetration accomplished. Growth in industry demand in the future will be lower than the 8% per year experienced in the 1970s. However, the average gain is expected to be slightly above GNP which will still translate into very substantial volumes.

This expected market growth, together with the capacity closures in the traditional petrochemical producing areas of the world, provides Canada with a potential marketing opportunity. This marketing opportunity has two parts. The first involves the export markets being vacated by the traditional producers, and the second involves the home markets of these producers. Both market categories are important, but the most important opportunity for Canada

exists within the U.S. market because of its size and gengraphic proximity. To take advantage of this opportunity, Canadian producers will have to be able to compete with emerging producers as well as the traditional producers on the U.S. Gulf Coast.

Despite the changing circumstances, the U.S. industry has maintained its domestic competitiveness because of its size and diversity, its access to and ability to use a broad range of low cost feedstocks, its capability to market all of the products manufactured in close proximity to the source of production, and its capacity rationalizations. However, the U.S. recognizes the inherent advantages of oil and gas rich countries in being able to produce commodity grade products at low cost. Therefore, the industry is shifting from commodity petrochemicals to specialty chemical products. This presents a significant opportunity for Canada to compete for an increased position in the markets which were previously supplied by the U.S. commodity producers.

Overcapacity remains a problem for the global petrochemical industry. However, with the less competitive capacity closing down, and the prospects for an improved economic outlook before us, it is generally accepted that the supply of petrochemical products should come back into reasonable balance with demand before the end of the decade. (The evolving supply/demand situations for ethylene, ammonia, and methanol are displayed in Appendix D-3.) It must be noted that the supply/demand balance will be reached at different times for different products. However, it is anticipated that additional capacities will be required before the end of the decade. Therefore, an opportunity exists for Canada to attract some of this new investment along with all of the associated economic benefits it will provide to the country.

d) **Potential For Growth**

The current restructuring of the global petrochemical industry and the growth in world markets present an important opportunity for

Canada. Canada has the potential to emerge as a significant participant of the industry worldwide because of its existing and potential strengths.

As already pointed out, Canada has a potential advantage over the traditional petrochemical producers due to the life index of its relatively large, proven oil and gas reserves. With new energy supplies likely to be found in the eastern and northern parts of the country, this advantage could become even greater. Also, Canada's developed industrial base, along with its other well-developed capabilities, provide a distinct competitive advantage over oil and gas rich countries that are just beginning to enter the industry.

The prospects for the Canadian petrochemical industry are extremely good because it possesses this unique combination of natural resources and developed strengths. In fact, there are few other industries in Canada with such promising opportunities for the future.

These strengths can help the Canadian petrochemical industry to increase its market share and to attract the required new investment in capacity. The industry will work at maintaining and improving its competitive strengths. However, it is essential that such industry efforts be combined with supportive government policies so that Canada can derive the potential benefits of its petrochemical industry.

Maintaining a high level of confidence in the Canadian petrochemical industry is particularly significant in the international marketplace. International customers, faced with a growing set of sourcing alternatives, must continue to regard Canada as a stable, reliable, cost-competitive supplier committed to serving international markets over the long term. If these customers experience or perceive instability, either in industry performance or in Canada's public policies, considerable harm will be done to the

industry's reputation in the international arena which will seriously detract from Canada's competitive position. This is an issue of growing concern within the industry.

About five years lead time is required to plan and build new petrochemical facilities. Therefore, if the Canadian industry is to have new capacity coming on-stream later this decade, it must begin planning within the very near future in spite of the current overcapacity in the industry. The policy environment in place during this time will determine whether or not Canada is the location of some of these future investments, which for Canada could amount to $3 billion. Investments of this magnitude would have very positive consequences for employment and trade. Therefore, the government should not delay in implementing measures and policies supportive of the petrochemical industry.

In summary, the years immediately ahead represent a very important opportunity for Canada. Seizing that opportunity could result in the major growth of this industry within the country. However, this will likely not happen unless the existing modern production facilities are adequately profitable in the interim. To this end, the industry will continue its efforts to improve profitability, and the government should formulate and implement policies in support of this industry, that will remain consistent in their effect over time.

3. MAJOR ISSUES AND RECOMMENDATIONS

(i) Access to Competitively Priced Feedstocks

Very broadly, there are two main segments of the industry in Canada as defined by the feedstocks utilized. One segment uses crude oil-derived feedstocks. The other segment of the industry is based on natural gas-derived feedstocks.

Domestic supply/demand projections show that Canada will not likely be self-sufficient in crude oil in the medium term. However, natural gas in Canada is projected to have a large and growing surplus. Therefore, the Task Force has concluded that the potential for growth will primarily be focussed in the gas-based segment of the industry during this time. At the same time, it was agreed that the oil-based segment has an important role to play in the Canadian economy and that actions can be taken to re-establish its competitiveness.

Both segments of the industry are experiencing difficulties at this time due to worldwide market conditions for petrochemical products, and domestic feedstock costs that have increased such that the petrochemical industry has lost its competitiveness. Government can not be expected to compensate for the effects of worldwide market conditions, but it can and should take actions to correct the feedstock situation.

As stated previously, Canada has abundant hydrocarbon resources that are the basis of the raw materials for the petrochemical industry. Despite this, the Canadian petrochemical industry lost its competitiveness in 1982 when the market responsive systems in the U.S. and elsewhere resulted in substantially falling feedstock prices at the same time as the feedstock costs in Canada were rising due to regulated oil and gas prices. The Canadian industry can not increase its product prices to compensate for these higher input costs, because product prices are determined by international markets. Therefore, the Canadian petrochemical industry requires government policies that allow for flexible feedstock prices that can move with those of our market responsive competitors.

The Task Force believes that it is in the best interests of the petrochemical industry to have its feedstock prices determined by a market responsive system. Therefore, it urges that the prices of oil and gas in Canada be allowed to become market responsive. A number of factors will have to change in this regard, so that feedstock prices can be determined by commercial negotiation. One change, for example, would

be the need to make common carrier pipeline systems available to facilitate commercial movement of feedstocks, so that consumers have the ability to acquire and transport the feedstocks for their own account.

Taxation is a very important factor relative to feedstock costs. Currently, the high upfront fiscal burden on oil and gas resources seriously affects the industry's ability to compete in domestic and international markets, and restricts the implementation and proper operation of a market responsive pricing system. The Task Force, therefore, firmly believes that the upfront fiscal burden on oil and gas resources in Canada should be reduced to the maximum extent possible and that government should rely on existing forms of corporate taxation for revenue generation.

It is recognized that this market responsive system may take some time to achieve. However, because of the opportunity available and the seriousness of the situation facing the industry in Canada, it is essential that corrective actions be taken as soon as possible. Therefore, the Task Force has made some short-term recommendations that should remain in place until a market responsive system is implemented.

The Task Force wishes to emphasize that until a market responsive system is in place, energy pricing policies must recognize and reflect the needs of the petrochemical industry and the international market within which it competes. The petrochemical industry, therefore, must not be considered simply an extension of the petroleum sector, but instead a core element of the overall Canadian manufacturing industry. Henceforth, it is essential that the industry be a participant in whatever deliberations take place in Canada on energy policy, so that its needs and economic benefits are recognized by government.

The Task Force also wishes to highlight the interdependence of the oil and gas industry and the petrochemical industry in Canada. The petrochemical industry provides this resource industry with a large, stable, year-round domestic customer. At the same time, the petrochemical

industry depends on the oil and gas industry for secure sources of feedstocks at competitive prices. Because of this interdependence, the Task Force urges that the feedstock recommendations be implemented in a way that will not impair the oil and gas industry.

The primary purpose of the Task Force's feedstock recommendations is to define what needs to be done in order for Canada to derive the potential benefits from its petrochemical industry. The Task Force does not consider it has the expertise to choose the specific mechanisms to make the required changes. However, the petrochemical industry wishes to take part in discussions leading to decisions on how the Report's recommendations will be implemented.

a) Gas-Based Segment

There is a large and growing surplus of natural gas relative to demand in Canada at this time. Both the country and the natural gas industry need markets for the development of this natural resource. The petrochemical industry currently uses 14% of the gas consumed in Canada and this should increase to 20% by the end of 1984. The petrochemical industry represented one of the fastest growing markets for natural gas in recent years and also offers the most potential for the future growth of gas markets in Canada. This is an important opportunity for both industries that must be developed to Canada's advantage.

Canada's gas surplus provides the driving force in the medium term for the petrochemical industry. Nearly all of the Task Force's recommendations on feedstocks are related to this position in natural gas and natural gas liquids. The Task Force believes that if the domestic price of natural gas reflected the supply and demand situation in Canada, it could provide the basis for the continued health and growth of the petrochemical industry while at the same time encouraging the continued development of a healthy oil and gas industry. Therefore, the Task Force recommends that:

(1) a market responsive policy environment be developed for natural gas in Canada, encompassing both supply and pricing.

However, the Task Force recognizes that in view of current government agreements, and industry contracts and obligations entered into under a regulated system, the full implementation of a more market responsive system will undoubtedly require considerable time to achieve. In the interim, the Task Force recommends that:

(2) immediate action be taken within the present regulated system to provide natural gas at a lower cost to industrial users in Canada. The Task Force also recommends that the reduction in cost be an amount equal to a reduction in the order of 15% of the price at the Toronto City Gate (which currently would be approximately 60¢ per MCF).

The Task Force believes that the resulting price would not only be more market related, but would also be roughly equivalent to the relative price that created the positive investment climate in Canada, which resulted in the recent gas-based investments.

This cost reduction may be achieved through a variety of mechanisms such as volume discounts, incremental volume incentives, two-tier pricing, and the availability of common-carrier pipeline systems to facilitate commercial movement of feedstocks so that industrial consumers have the ability to acquire and transport these feedstocks for their own account.

The implementation of such a recommendation for natural gas should not detract from or limit the ability of industrial consumers to continue to negotiate special price arrangements with suppliers. This is consistent with the policies and practices currently existing in Alberta, and being initiated in British Columbia.

While the rationale has been developed for re-establishing the international competitiveness of the Canadian gas-based petrochemical industry, the Task Force believes that the same rationale also exists for many other segments of the domestic manufacturing industry. Therefore, the application of this recommendation is intended to have a positive impact not only on all petrochemical producers who use natural gas in Canada, but also on other gas-consuming industries in Canada which would also become more competitive in domestic and international markets.

The increased activity that is expected from this measure would increase revenues more than enough to offset the potential costs and, in fact, would provide a significant net benefit to Canada. This effect is detailed more fully in the findings of the economic impact studies that are discussed later in the Report.

If appropriate actions are not taken on this recommendation, the gas-based segment of the industry will consume less natural gas and will most likely not undertake any further developments. Some parts of the industry may even decline.

b) Oil-Based Segment

A large segment of the petrochemical industry uses feedstocks derived from crude oil. However, the feedstock conditions under which the viability of these oil-based facilities was established have changed dramatically and Canada's competitive advantage has now disappeared.

The Task Force believes that, on balance, there is little justification to keep the price of crude oil in Canada artificially low for petrochemical purposes given the current and foreseen supply/demand balance for crude oil. However, the Task Force believes that the price of crude oil in Canada should become market respon-

sive, so that it can move freely with world conditions and particularly with that of the major competition on the U.S. Gulf Coast. At the time of this writing, the average acquisition cost of crude oil on the U.S. Gulf Coast was below the average cost of crude oil in Canada in competitive terms. It should be noted that such a market responsive system is important to all industry in Canada because it will help improve international competitiveness. Until Canada achieves a market responsive pricing system for domestic oil, the Task Force recommends that the government:

> **(3) develop a monitoring system to track the average acquisition costs of crude oil in Canada and on the U.S. Gulf Coast to ensure, to the maximum extent possible, that Canadian crude oil pricing policy does not place Canadian consumers and industry at a competitive disadvantage. Any adjustments required should be implemented on the most current basis possible.**

It is believed that this measure would result in a Canadian oil price that would closely approximate the price under a market responsive system.

In spite of the lost competitiveness of oil-derived feedstocks, the Task Force concludes that the oil-based segment can re-establish its competitiveness by increasing its ability to use a wider range of feedstocks. In the near term, this involves the continuation and extension of the segment's efforts to reduce its use of oil to the maximum extent practicable.

This would be compatible with the off-oil policy of the federal government. It should be pointed out that the industry has already taken steps to substantially reduce the amount of crude oil it requires for petrochemical production. However, the segment's ability to make further reductions may be limited by its current lack of profitability and ability to access alternate feedstocks.

Increasing flexibility would place this segment of the industry in a feedstock position similar to that of the U.S. Gulf Coast petrochemical industry. Flexibility is a very important competitive factor for the petrochemical industry because experience has shown that both the availability and the price of feedstocks vary considerably. The Task Force concludes that feedstock flexibility will give the segment the best opportunity to retain its viability over time.

The Task Force notes that it would still be necessary to use some oil-based feedstocks in this segment of the industry. This is because of established customer demands for certain primary products, and the fact that some petrochemical products can only be made from oil-based feedstocks. In addition, there are technical considerations that limit the degree of plant conversions. However, when modifications to eastern facilities have been completed, the amount of crude oil required for petrochemical use will be further reduced by at least 50% of current levels.

A feedstock alternative that should continue to be exploited fully by the petrochemical industry is the use of relatively lower value oil-based streams available from the refining industry. Product quality and quantity demands are changing for the refining industry which could well result in different streams within the refinery having relatively lower values from time to time. A considerable opportunity exists in the petrochemical industry's use of these materials. Not only could they be upgraded and enhanced in value, but they could also provide an acceptable feedstock alternative that will not create additional crude oil consumption for petrochemical needs.

Alternative feedstocks available to reduce the use of oil-based feedstocks have also been examined. Ethane has limited use as an alternative because of the required product slate. However, two of the natural gas liquids are relatively more available at this time

to replace oil-based feedstocks for petrochemical use. These are propane and butane which are available in amounts surplus to Canada's needs and, in fact, considerable volumes are now exported.

Use of these products would be consistent with a government objective to reduce oil imports through the increased domestic use of natural gas liquids, as stated in the Canada-Alberta Memorandum of Agreement of September, 1981.

After reviewing submissions on future supplies of propane and butane, the Task Force concluded that evidence indicated an adequate supply to meet all probable demands in the future. In addition, application of the recommendations for the gas-based segment will tend to increase supplies of these products, as propane and butane are primarily co-products of gas production. In the longer term, synthetic gas liquids from oil sands production could be used to augment the supplies of these natural gas liquids.

The prices of propane and butane are not regulated today and are determined by their market value. The Task Force believes that the market determination of price should be left in place. Therefore, the Task Force recommends that government:

(4) retain the present market responsive policy framework for propane and butane in Canada.

It is believed that long-term contracting for an assured offtake of these materials in a Canadian market will result in competitive feedstock costs for the petrochemical industry. However, two other factors are important in this regard.

The first factor involves appropriate surplus tests. Currently, a surplus test is applied to propane to ensure that only quantities of propane surplus to Canada's needs are allowed to be exported. Butane demand in Canada relative to available supply has been low

enough that the surplus test on butane was discontinued in 1983. However, the supply of butane must be relatively assured if the conversion decision and its costs are to be undertaken. The surplus test for butane should, therefore, be reinstated. The Task Force recommends that government:

(5) ensure the domestic supply of butane and propane by applying the appropriate surplus tests for exports.

The other factor is the cost elements of propane and butane. The Task Force believes that the high upfront fiscal burden occurring at the point of first sale may create a relatively high cost floor for these materials. In order to permit more flexibility in responding to market forces and thus provide the petrochemical industry with more competitive feedstock costs, the Task Force recommends that government:

(6) reduce the upfront fiscal burden on propane and butane used for industrial purposes in Canada, in order to provide increased negotiating latitude for pricing between the suppliers and purchasers of these products.

In order for the oil-based segment to further develop the flexibility to use a variety of feedstocks, investment in production equipment and infrastructure will be required. Such investment will involve not only converting manufacturing facilities, but also modifying receiving and handling facilities and other operational aspects, to provide the capability to receive and run a variety of feedstocks. Exact definition of the required changes will require considerable technical study. However, conversions of this type are feasible and have been accomplished elsewhere in the world.

The Task Force believes that the oil-based segment of the petrochemical industry should make these changes to maximize its feedstock flexibility in order to improve its long-term viability. To this end, the Task Force recommends that government:

(7) initiate a transition program for the oil-based segment, the objective of which is to increase feedstock flexibility and move off oil to the maximum extent practicable in the near term. This program would involve a study period of up to 12 months, followed by a period of up to 24 months to implement the required changes. During these periods of transition, financial assistance would be provided to the oil-based segment in order: that the segment can sustain itself during the transition periods; that the segment is not competitively disadvantaged with respect to the gas-based segment; and to provide assistance with the costs associated with the studies and subsequent modifications. Since circumstances, including refinery and transportation linkages, differ for each manufacturing centre, the Task Force recognizes that feedstock flexibility may require the application of different measures in each situation. Therefore, the details of the program, including commitments and amount of assistance, would be negotiated between government and the individual companies involved within the described framework.

The steps envisioned in the implementation of the recommendations for the oil-based segment are as follows:

1. The appropriate propane and butane surplus tests should be instituted as soon as possible, and changes should be made to the upfront fiscal burden on these materials as recommended.

While these steps are being organized, the companies concerned should negotiate with government for financial assistance under the transition program within a framework that is described on page 26. In consideration of the assistance to be received, the companies would make a commitment to maintain a reasonable level of operations while the necessary feedstock negotiations and technical studies are being conducted. The industrial adjustment assistance would start to flow to the companies involved at the same time as the gas-based recommendation involving cost reduction is acted upon.

2. When the required studies and feedstock negotiations are successfully completed, an effort that will take up to one year, the companies would then arrange the necessary financing and confirm their commitment, including considerations of human resource requirements, training programs, etc., to achieve substantially increased feedstock flexibility.

3. The companies would make every effort to complete the work program in the shortest possible time, which is expected to take up to two years. As the modifications are completed and alternate feedstock use increases, the transition assistance would decrease. On completion of the agreed work, all assistance would stop. Therefore, the provision of adjustment assistance will not exceed three years.

4. If, as a result of the required technical studies and negotiations on feedstock supply contracts, the alternative feedstock route is proven not to be viable, this would be promptly reported to government. The industrial adjustment assistance would be suspended at that time, and those companies or sectors involved would take up further studies and discussions with government with the objective of finding an acceptable solution.

The Task Force has agreed that the relative competitive balance between the gas- and oil-based segments needs to be maintained

until such time as the oil-based industry is able to convert to the use of significant quantities of alternative feedstocks. This can be accomplished if two factors are acted upon.

First, the provision of adjustment assistance for the oil-based segment and the gas cost reduction for the gas-based segment should occur at the same time. It is also very important that this adjustment assistance be provided in the very near future because the continuation of the present situation may very seriously impair the oil-based segment's ability to remain in operation.

The second factor that can help maintain the relative competitiveness of the segments involves the mechanism that government uses to determine the amount of financial adjustment assistance that the oil-based industry should receive. It is important that the amount of this short-term assistance be roughly equivalent to whatever unit cost decrease is initiated for gas, or approximately 15% of the feedstock and energy costs directly related to the production of ethylene, propylene, butadiene, and butylenes (excluding aromatics).

In summary, the recommendations relative to the oil-based industry will assist the segment, in conjunction with the industry's own actions, to stay in operation and undertake the structural changes to provide the capability for increased feedstock flexibility. These changes will help achieve the longer-term viability of the oil-based segment. In the near term, the segment can move off oil to the maximum extent practicable while, in the long term, the segment will be able to use the appropriate mix of feedstocks that is most competitive at any given time. The recommendations provide the means by which the segment can sustain itself and continue its significant economic and social contributions to Canada. An impact analysis of the feedstock recommendations for the oil-based segment indicates that the revenues to be gained from the continuing production and employment in the segment would more than offset the costs that the Task Force estimates would be required to implement such actions. (See Section 4.)

If the recommendations are not acted upon, the continued viability of this segment of the industry would be put in serious question, and further decline would likely result.

The recommendations for the oil-based segment should provide assistance to most components of that segment. However, one significant component will receive only limited assistance from the recommendations. This component is aromatics production which involves the manufacture of benzene, toluene, and xylene. A considerable proportion of aromatics production in Canada is undertaken in refineries rather than chemical complexes. Therefore, the production of these products will continue to require oil-based feedstocks. It must be noted that a strong submission was received requesting assistance specific to the aromatics sector. However, the Task Force was not able to find an acceptable mechanism to provide such assistance to this component of the industry that would be in line with conclusions concerning crude oil pricing. At the same time, the Task Force would like to strongly emphasize the importance of maintaining crude oil prices in Canada in line with those on the U.S. Gulf Coast in order to assist the competitiveness of this important component of the petrochemical industry (see Recommendation 3).

(ii) Access to International Markets

With its efficient, world-scale facilities, the Canadian petrochemical industry has the potential to significantly increase its exports. Such increased sales represent an important opportunity for Canada to upgrade its natural resources and improve its balance of trade. Therefore, access to international markets is an important issue for both the industry and the country.

The industry would like to have unimpeded access to the widest range of markets possible. In return, the industry acknowledges and accepts the requirement to have an open domestic market for petrochemical products. The Task Force is confident that, if the appropriate actions

are taken on the recommendations in this Report, then the petrochemical industry's long-term, competitive viability in domestic and international markets will be substantially improved.

Currently, global overcapacity and the recession have created a severe strain in the world trading system. Protectionist pressures have grown as have tensions between major trading countries as each strives to provide jobs for its respective work force. The risk of misusing contingency import protection for such purposes is real. However, international rules reduce the risk of arbitrary recourse to such measures and can provide the instruments necessary to deal with problems. Therefore, appropriate and timely exercise of Canada's GATT rights can be effective in preserving market access for Canadian exports to these markets.

Given our large stake in trade, the Task Force urges the federal government to actively preserve and enhance the multilateral trading system embodied in the GATT. Such efforts should be supplemented by constructive bilateral negotiations with major market areas where we can find mutual interests, especially those that are closing outdated petrochemical facilities and unlikely to invest in more efficient commodity capacity.

The largest and closest of these market areas is the U.S. The industry is interested in improving access to this market. To this end, meetings between representatives of the Canadian and American petrochemical industries have been held to begin discussions on items of mutual interest in trade. The government has already stated its interest in pursuing bilateral trade agreements in petrochemicals with the U.S. both in its report "Trade Policy for the 1980s", and more recently in the speech from the Throne. The Task Force strongly supports this initiative.

The Task Force believes consideration should also be given to petrochemical trade negotiations between Canada and Japan. Again, the Canadian petrochemical industry has already initiated discussions on trade interests with its Japanese counterparts. The Japanese market represents a major trading opportunity particularly for existing and future petrochemical developments in western Canada. The Task Force believes it could also be to Japan's advantage to seek sourcing from a politically stable, reliable country like Canada, to complement its domestic restructuring plans.

The petrochemical industry also supports the exploration of mutual trade benefits between the European Economic Community and Canada.

Therefore, the Task Force recommends that:

(8) a concerted effort by industry and government be developed towards the reduction of trade barriers for petrochemical products with our major trading partners. In particular, efforts should focus on bilateral negotiations with the U.S., and the continued development of negotiations with Japan.

The Task Force notes that export incentive programs which exist in some other trading countries, could be an important competitive factor to the Canadian industry. This matter is currently under review in the Export Taxation Study being conducted by the International Business Research Centre of the Conference Board of Canada. This study was initiated by the Export Trade Development Board and the Department of Finance. The petrochemical industry fully supports this activity and, in fact, is participating in this study. It will be very interested in the results and the actions that are to be taken to improve competitiveness in international markets.

(iii) Transportation

The petrochemical industry's transportation costs exceed $550 million per year. Such costs vary greatly within the industry depending on the petrochemical product and the market location. However, the average cost of transportation represents approximately 10% of the selling price of a product, and can be as high as 35% in some export markets.

The Canadian industry faces a number of competitive disadvantages in terms of transportation. First, there is the physical disadvantage related to the geographical location of the Canadian petrochemical industry relative to its markets. It is, therefore, very important to pursue the efficient operation of the Canadian transportation system to minimize the negative effects of this disadvantage, and in particular to ensure that adequate rail and terminal capacity is maintained in western Canada.

The second disadvantage relates to the existence of a different regulatory system in Canada than in the U.S. The Task Force believes that benefits would be realized by developing a more competitive and market responsive transportation system in Canada. The Task Force acknowledges that several federal studies to examine the current regulatory regime are underway, and notes that the industry wishes to be involved in these studies.

The Canadian petrochemical industry has taken actions to reduce transportation costs. These actions include the exploitation of the U.S. free market environment, innovations in equipment, and the use of computerized transportation systems. The industry will continue to develop cost-cutting measures such as these in the future. However, as stated before, costs can be reduced further through adjustments to the regulated transportation environment. (See Appendix E.) Therefore, the Task Force recommends that government:

(9) **assist with the development of a more market responsive transportation system in Canada to improve the country's competitiveness and ensure the long-term health of both the petrochemical and transportation industries. The development of such a system should include the active participation of the petrochemical industry.**

The Task Force also recommends that:

(10) **government-industry efforts be increased to achieve regulatory reciprocity with the U.S. on cross-border transport of dangerous goods in the short term. The objective in the longer term is for uniformity as far as it is practicable and warranted by Canadian interests.**

(iv) Technology

The Canadian petrochemical industry is among the leaders in the application of technology, and this activity accounts for an appreciable part of Canada's total research and development spending. In fact, the chemical industry has research and development expenditures of 1.1% of sales, which is one of the highest levels in Canada. In addition, the industry's research and development programs result in many spin-off technologies which further enhance technical employment opportunities and stimulate additional university research. While technical capability is not sufficient by itself to ensure the health of the petrochemical industry, it is a necessary factor. Any deterioration in the technological competence of the industry would seriously undermine its competitiveness.

The petrochemical industry's contribution to technological progress in Canada stems from its need to be innovative and technologically advanced by world standards. It enjoys ready access to important global

technology and has a well-proven record of applying these developments to Canadian requirements. Canadian organizations have also developed their own areas of specialization and a number of new breakthroughs have been exported. For the above reasons, the Task Force clearly supports the continuation of free trade in technology.

Much of the industry's research and development is concentrated on providing technical support to customers and this, in turn, stimulates a high degree of innovation in downstream manufacturing sectors. Much of this work involves transferring technology and assisting in developing applications and new products. This is an essential part of the development process in R&D that is required to bring innovative products to the market. Although highly technical in nature, these efforts do not always fall under the government's definition of research and development. Therefore, the bulk of funding in the industry is internally generated, and access to government incentives is relatively restricted. The Task Force recommends that government:

> **(11) recognize the heavy expenditures required to bring new ideas and products from the laboratory to the marketplace and extend the application of current taxation incentives for R&D to work in these later, very important stages of the innovative process.**

For its part, the petrochemical industry will continue to strive to enhance its level of technological excellence and increase its efforts to assist customer industries.

(v) Capital Costs

The petrochemical industry is a capital intensive industry and, as such, its capital costs represent a significant portion of the end product cost.

This factor is important to the competitiveness of the industry since construction costs in Canada are about 15% - 30% higher than on the U.S. Gulf Coast. Reasons for these higher costs include:

- the colder climate which reduces construction efficiency and adds to costs in terms of freeze protection, insulation, deeper foundations, etc.;

- remote siting which adversely affects the cost of a project;

- the higher cost in Canada of some equipment required by the industry; and

- the often unclear regulatory requirements at all levels of government.

Canada's colder climate and remote siting of projects cause some noteworthy differences in conditions in the two countries that affect the capital costs of Canadian industry. For example, Canadian companies are exposed to higher rates for borrowing in order to compensate for the greater risk perceived by lenders. In addition, since new plants cost as much as 30% more than in the U.S., the total interest expense is correspondingly greater.

Taxation is a vehicle associated with capital costs that can provide a mechanism to offset the higher investment costs in Canada. In light of this, the Task Force recommends that government:

(12) initiate a study of those aspects of taxation policy directly related to the capital costs associated with major projects, in order to determine ways in which Canada's capital cost disadvantages might be significantly reduced or eliminated.

The Canadian petrochemical industry historically has relied heavily on the domestic supply of high-quality materials, equipment, and services in its operations. This has been reflected in the Canadian content performance of the industry on its major projects, which has been in the order of 80% - 90%. This significantly exceeds any stated objectives of governments. The industry will continue to actively support the concept of Canadian content in all aspects of its business undertakings.

The Task Force recognizes the need to develop the Canadian metal fabricating and machinery manufacturing industries. However, in the cases where process equipment is not available in Canada, either due to the absence of manufacturers or the heavy loading of manufacturing capacity, imports of such equipment should be eligible for duty remission under the Machinery Program administered by the Department of Regional Industrial Expansion. At present, the Machinery Program appears to exclude process equipment. The Task Force recommends that government:

(13) make process equipment not available from Canadian production eligible for duty remission under the Machinery Program administered by the Department of Regional Industrial Expansion.

To further reduce the higher costs associated with some equipment in Canada, the Task Force also recommends that:

(14) sales tax on material and equipment used in the construction of manufacturing facilities be remitted.

Government can also take action to reduce the costs associated with the regulatory activities. On any given project it is almost impossible to predict in advance which agencies should be contacted, what their requirements are, and what the procedures are for obtaining approvals. The approval programs require substantial effort in preparation. Perhaps of more importance is the delay involved and the consequent

escalation in costs. Also, within the planning process, regulations made under the authority of various agencies are not consistent from jurisdiction to jurisdiction. Therefore, the Task Force believes that government should promote inter-agency coordination in order to reduce costly duplication and delays in the regulatory process. Movement towards the "single-window concept" would be highly encouraged by the Task Force. As a first step in this direction, the Task Force recommends that government:

(15) in collaboration with industry, develop a framework and set of recommendations designed to clarify and streamline the regulatory approval process associated with major projects, and to identify areas for the possible harmonization of government standards.

The Task Force also believes that benefits would accrue from the joint study by producers, labour, government, and major contractors to determine how productivity and safety performance can continue to be improved on major projects in Canada, as a means to try to further reduce capital costs.

4. ECONOMIC IMPACT OF THE TASK FORCE RECOMMENDATIONS

The Task Force firmly believes that implementation of the recommendations by government coupled with industry's own initiatives taken as a result of government action, would provide significant net benefits to the Canadian economy.

From implementation of the recommendations for natural gas pricing, the Task Force estimates that, in the short term, there could result an increase of 3% - 6% in the domestic consumption of natural gas over what would have occurred with continuation of the current environment. It is estimated that much of the eastern Canadian ammonia industry and

the methanol industry, both currently at risk, could continue to operate at a higher level and, perhaps, develop. Over the remainder of the decade, Canada's gas-based petrochemical industry has the prospect of participating to a significant degree in the next wave of investment that will be required as the world petrochemical supply and demand comes into balance. Under such circumstances, investments of some $3 billion could be initiated early in the second half of the decade in ethylene and its derivatives, as well as ammonia. This would further result in the creation of thousands of jobs during the construction period and some $2 - 3 billion of increased annual production largely oriented towards the export market. Overall, major downstream users, such as the plastics fabricating industry, could also greatly benefit from being more highly supported in their own efforts to increase production and exports.

Finally, the Task Force strongly believes that the Canadian economy could also benefit significantly from a decrease in the order of 15% in the cost of natural gas for industrial users in Canada.

The Task Force also considers that implementation of the recommendations for the oil-based segment of the industry could secure a significant number of jobs in the petrochemical industry itself, in a number of closely-related downstream customer industries, as well as in other industries which provide supplies and services to these petrochemical producers and to their major customers. Further benefits, the Task Force considers, could also accrue in the longer term to major downstream users through having a broader range of support available to them.

In order to provide further assistance in assessing the net benefits that would accrue to the petrochemical industry and to Canada from implementation of the feedstock recommendations, the Task Force commissioned a number of studies. Each of the studies utilized econometric models as tools to assist in determining the economic impact associated with the Task Force's recommendations. The three models used were:

(1) Statistics Canada's Input/Output model

This model, which was recently updated for chemical studies, can be used to estimate the impact of a change in the production of petrochemicals on jobs, employee incomes, other industries, and government revenues.

(2) University of Toronto's Institute for Policy Analysis FOCUS/PRISM model

This model specializes in evaluating alternative fiscal and monetary policies.

(3) Data Resources of Canada's Energy model

This detailed model of energy supply and demand can be used to evaluate the change in the demand for natural gas and other energy products resulting from the proposed change in price. This model is linked to a macro-economic model that measures the combined effect of changes in energy demand, costs, investments, and trade position.

All three studies were commissioned because no one model could provide the full extent of the analysis required. These particular models were chosen because they are used by government and have credibility within government and industry.

A number of assumptions had to be made for the purposes of the studies, and these were taken mainly from submissions to the Task Force or from data that had been previously supplied to the federal government and developed further by the latter for purposes of internal study. In addition, some assumptions had to be generated directly to approximate some of the recommendations contained in this Report. Some of the more important assumptions are detailed later.

The Task Force does not believe that it can or should predict what will occur with individual companies under various scenarios. The Task Force clearly recognizes the need to fully comply with both the spirit and intent of Canada's competition policy. It is, therefore, the responsibility of the individual companies to submit their own information on a confidential basis to government. Statements made in the following sections should not be interpreted as predicting individual company behaviour nor as predicting impacts in precise terms, but only as providing a sense of direction.

Nevertheless, after examining the study results, the Task Force believes that they are directionally correct and that they clearly support its belief that implementation of the recommendations in the Report, and consequent action by industry, would provide significant net benefits to the Canadian economy as a whole.

Scenario Assumptions

Two basic scenarios were chosen. One, as a base case, reflected an estimated situation that could prevail with continuation of the current policy environment. The second scenario estimated the impact that could occur with full implementation of the feedstock recommendations in the Report, by both industry and government.

The key assumptions included as inputs were as follows:

1. For the gas-based petrochemical industry, it was assumed that the differential between the two scenarios would range from 20% - 30% in the production of ethylene, methanol, and ammonia, all destined for export markets. In addition, if recommendations are implemented, two ammonia plants and an ethane-based ethylene complex would be built later in the decade with a total overall investment of $2.5 billion in 1982 dollars.

2. For natural gas, the price for all industrial users was assumed at 55% of blended crude equivalent in Toronto under the recommendation scenario, as opposed to no change in existing energy policy under the no-change scenario.

3. For the oil-based segment of the industry, the assumption made was that shutdowns would occur if there were no policy changes; otherwise, with policy changes, it was assumed that they would continue operating, but with no significant growth in new capacity.

4. Rubber products (exclusive of footwear) were assumed to face a 50% cut in output by 1990 in the no-change scenario.

5. The production of the plastics fabrication industry was assumed to have an eventual difference of 15% as a result of different growth rates in the industry under the two scenarios.

Statistics Canada Input/Output model

The results obtained from this model were as follows:

If the recommendations are not implemented, the resulting curtailment of production in the oil-based segment could lead to a loss of approximately 4,000 jobs in the petrochemical industry itself and could put at risk a significant number of jobs in closely-related downstream customer industries. It is estimated that as many as 21,000 jobs in these downstream industries could be lost or forgone by 1990. Such a curtailment would lead to further significant job reductions in other industries which supply or service the petrochemical producers and their major customers.

Government revenues would benefit if the lower production and consequent job loss could be avoided. The model shows that government revenues derived from the threatened operations would gradually

increase to a minimum of about $200 million per year (constant 1979 dollars) in 1990, exclusive of the proceeds of new energy taxes imposed since 1979.

Models of the Institute for Policy Analysis and Data Resources of Canada

The main directional results of implementing the recommendations were estimated as follows by the two models:

(a) A higher level of Gross National Product. By 1990, the studies indicate potential increases in the order of $3-4 billion annually (in current dollars).

(b) A significant increase in employment which, cumulatively, could exceed 100,000 man-years over the remainder of the decade, or an average of 15,000 - 30,000 jobs per year.

(c) Trade benefits in the order of $1 - 2 billion would also result on an annual basis by the end of the decade.

(d) A major net benefit would result from incremental industrial consumption of natural gas, increasing that consumption in Canada by 14% by 1985 and 25% by 1990. This benefit would be available to the natural gas producers as well as both levels of government. The shares of this net benefit accruing to each of the three parties involved would obviously be the result of negotiations between those parties.

In summary, the analyses indicate that significant economic benefits to the Canadian economy would flow from implementation of the Task Force recommendations, and that these benefits would go well beyond the petrochemical industry itself. In addition to the gains in output, employment, incomes, and natural gas usage which might be achieved at little or no cost in the longer term to the fiscal positions of government, there would be a sizeable rise in net receipts from foreign trade.

The models and their results described above give strong encouragement to the further evaluation of the recommendations through quantitative analysis techniques. The Task Force believes that it would be of major benefit to continue the consultative efforts that have been initiated between government and industry representatives in this aspect.

5. CONCLUSIONS

The Task Force has concluded that the petrochemical industry in Canada can be viable over the long term and achieve significant future growth because it has a number of fundamental competitive strengths.

Some of these strengths, such as those dealing with capabilities and infrastructure, have been developed by industry over the years. However, the most important strength lies in Canada's energy resources which provide the source of feedstocks for the industry. Of particular competitive importance at present is Canada's large and growing surplus of natural gas.

Despite these natural and developed advantages, Canadian petrochemical producers are currently facing problems of an urgent nature. These problems have been caused by the international recession and worldwide overcapacity in the industry which have created a particularly difficult competitive environment, as well as the costs of domestic feedstocks in Canada. In fact, the Canadian industry lost its competitiveness in 1982 when the more market responsive system in the U.S. and elsewhere resulted in substantially falling feedstock prices at the same time as feedstock costs in Canada were rising due to regulated oil and gas prices.

The market problems facing the industry are being overcome by the global restructuring taking place and the renewed growth in petrochemical markets. This improved environment provides a significant opportunity for the Canadian industry, as long as it can access domestic

supplies of feedstocks at market related prices. Such a market responsive pricing system for feedstocks would once again place both segments of the Canadian petrochemical industry in an advantageous competitive position with the ability to grow and attract significant new investments in capacity that will be required before the end of the decade.

The Task Force wishes to note that Canadian petrochemical producers did not sit idle when faced with the market and feedstock challenges. They responded by closing inefficient facilities, reducing crude oil requirements, improving energy efficiencies, and generally cutting costs in all areas within their control. However, since the majority of producers' costs (feedstocks) as well as their product prices are largely outside their control, it will take a coordinated and concerted effort by both government and industry if the full potential of this Canadian industry is to be achieved.

In this regard, the Task Force has outlined a number of recommendations which encompass such factors as transportation, research and development, and capital costs. All of these factors are important because they impinge on the competitive capability of the Canadian industry and, therefore, they should be attended to on a timely basis.

However, there are two factors that are particularly important for the industry, one of which is crucial and requires very early government response.

First, access to competitively priced feedstocks is particularly crucial to the industry's future. In order for Canada to realize the potential from the strength of its natural gas resources, such resources will have to be made available at costs which reflect a high degree of market responsiveness, estimated to be about 15% lower than at present (as measured in Toronto). In addition, access to a wider range of feedstocks for the oil-based segment will have to be encouraged and supported through financial assistance offered under a three

year transitional program. Such a transition requires that domestic supplies of propane and butane be made available for petrochemical use in Canada and that the upfront fiscal burden on these products be reduced.

Second, in order to assist the industry in properly positioning itself in world markets, it will be important for government and industry to focus their effort on achieving increased bilateral market access between Canada and the U.S.A. and to initiate trade discussions with Japan.

The Task Force also believes it critical that the government recognize petrochemical manufacturing as an industry of strategic significance to Canada, that should be consulted on policy matters and other measures in areas that could impact on it such as energy, trade, taxation, technology, and transportation.

Government can create the necessary environment to both maintain and achieve the growth potential of the industry. Once the government creates this environment, the Canadian petrochemical industry will take significant complementary actions to help ensure the industry's long-term viability. For those companies in the gas-based segment of the industry, this will mean a redoubling of efforts towards firmly establishing themselves in the international market, which could lead to new investments in capacity over the remainder of the decade. For those companies in the oil-based segment, carrying out the necessary adaptation will require a total effort at commercially negotiating economic propane and butane feedstocks as well as relatively lower value refinery streams, and then carrying out the required modifications.

The Task Force is confident that by making the coordinated and concerted effort as described above, the government and industry can safeguard thousands of jobs, enhance the job creation potential for the industry, increase export opportunities, and attract new investments to Canada. This effort will allow the petrochemical industry to continue to be a major contributor to a strong Canadian economy.

APPENDIX A

BACKGROUND

APPENDIX A-1

PETROCHEMICAL INDUSTRY TASK FORCE

Terms of Reference

The Task Force will provide advice to the Government of Canada on the future of the Canadian petrochemical industry, and on industry and government measures which would allow the industry to increase its contribution to the national economy. In formulating its recommendations to the Ministers, consideration will be given to all relevant matters and specifically to:

- Identifying all factors that influence the competitiveness of the industry.

- The outlook for the domestic and international supply and demand for the products of the industry.

- The domestic and international competitive position of the industry and the future international trading environment.

- The regional dimensions of the industry within Canada.

- The importance of the petrochemical industry to its upstream suppliers and downstream customer industries.

It is understood that the petrochemical industry for the purpose of this task force includes ammonia.

The Task Force is directed to report to the Minister of Regional Industrial Expansion and the Minister of Energy, Mines and Resources by December 31, 1983.

APPENDIX A-2

REPRESENTATIONS RECEIVED BY THE TASK FORCE

Alberta Federation of Labour
Canadian Agricultural Chemical Association
Canadian Chemical Producers' Association
Canadian Construction Association
Canadian Fertilizer Institute
Canadian Gas Association
Canadian Labour Congress
Canadian Manufacturers of Chemical Specialties Association
Cyanamid Canada Inc.
Dome Petroleum Limited
Energy & Chemical Workers Union
Government of Alberta
Government of British Columbia
Government of Manitoba
Government of Newfoundland and Labrador
Government of Nova Scotia
Government of Ontario
Government of Quebec
Government of Saskatchewan
Gulf Canada Products Co.
Ontario Natural Gas Association
Propane Gas Association of Canada Inc.
Rubber Association of Canada
The Society of the Plastics Industry of Canada
Suncor Inc.
Vinyl Council of Canada

APPENDIX B

THE CANADIAN PETROCHEMICAL INDUSTRY

APPENDIX B-1

THE CANADIAN CHEMICAL PRODUCERS' ASSOCIATION - PETROCHEMICAL INDUSTRY

SECTION "A" - TOTALS — MILLIONS OF CURRENT DOLLARS

	Petrochemicals 1982	Fertilizers 1982	Petrochemicals & Fertilizers 1982
1. CAPITAL			
(a) Fixed Capital Expenditures	1,238	576	1,814
(b) Normal Depreciation	204	45	249
(c) Write-offs	35	5	40
(d) Inventories Plus Receivables	1,413	262	1,675
(e) Inventories Plus Receivables Minus Payables	846	191	1,037
(f) Gross Investment - Year End	7,355	1,997	9,352
(g) Net Investment - Year End	5,940	1,614	7,554
(h) Gross Fixed Assets - Year End	5,942	1,735	7,677
(i) Accumulated Depreciation	1,415	383	1,798
(j) Long & Short Term Debt	3,049	449	3,498
2. SALES			
(a) Total End Product Sales	3,442	688	4,130
(b) Sales Including Intermediates	4,434	711	5,145
(c) Sales Canadian Production to Canadian Market	2,074	404	2,478
(d) Total Exports	1,368	284	1,652
3. TRADE BALANCE			
(a) Imports*	1,043	43	1,086
(b) Balance of Trade*	325	241	566
(c) Canadian Consumption*	3,117	447	3,564
4. EMPLOYMENT			
(a) Total Equipment	15,455	2,819	18,274
(b) Number of University Graduates	2,683	436	3,119
(c) Total Pay of all Employees	497	91	588
5. RAW MATERIAL PURCHASES			
(a) Total - Intermediates Included	2,690	400	3,090
(b) Intermediates Only	1,018	25	1,043
(c) Freight on Intermediates Purchased	26	2	28
6. UTILITIES	334	69	403
7. OTHER COSTS & (INCOME)			
(a) Plant Overhead, Local Taxes, etc.	567	22	589
(b) Admin, Selling, TSS, R&D	180	21	201
(c) Royalties, Management Fees	20	3	23
(d) Interest on Long/Short Term Debt	221	19	240
(e) Other Costs & (Income)	(84)	(17)	(101)
8. PROFITS AND TAXES			
(a) Profit Before Interest, Taxes and Special Write-offs	(7)	57	50
(b) Net Profit Before Taxes, After Interest and write-offs	(244)	37	(207)
(c) Total Taxes - Current & Deferred based on 8(a) but after write-offs	(10)	24	14
(d) Total Taxes - Current & Deferred based on on 8(b) (After Investment Credits & Inventory Allowances)	(115)	16	(99)
(e) Write-offs Over Normal Depreciation	16	1	17
(f) Net Income After all Charges Except Interest	(13)	EST 32	19
(g) Investment Tax Credits	22	-	22
(h) Tax Effect of Inventory Tax Allowance	-	2	2
(i) Net Profit/Loss After Taxes	(129)	20	(109)
(j) Deferred Taxes	(88)	68	(20)
9. TOTAL VALUE ADDED	1,410	242	1,652
10. NUMBER OF PLANT SITES	61	12	73

APPENDIX B-1

	Petrochemicals 1982	Fertilizers 1982	Petrochemicals & Fertilizers 1982
11. INVESTMENT			
(a) Gross Investment per Dollar End Product Sales	2.1	2.9	2.3
(b) Gross Investment Per Employee - $1,000	475	708	512
(c) Depreciation as % of Gross Fixed Assets	3.4	2.6	3.2
12. TRADE			
(a) % of Total Export Shipped to U.S.A.	53	98	70
(b) Canadian Production as % of CDN. Consumption*	110	154	16
(c) Exports as a % of End Product Sales	40	42	40
(d) Imports as a % of Cdn. Consumption*	33	10	30
13. EMPLOYEES			
(a) Average Remuneration $1,000	32.2	32.3	32.2
(b) End Product Sales per Employee $1,000	223	244	226
(c) Other Fringe Benefits as % of Total Remuneration	15.7	19.8	16.3
14. RAW MATERIALS - % OF CANADIAN ORIGIN	90	95	91
15. PROFITS - (AFTER TAX - BEFORE INTEREST)			
(a) % Gross Investment	EST (0.2)	EST 1.6	EST 0.2
(b) % Net Investment	EST (0.2)	EST 2.0	EST 0.2
(c) % of End Product Sales	EST (0.4)	EST 4.6	EST 0.5
PROFITS - AFTER TAX AND AFTER INTEREST			
(d) % of Gross Investment	(1.8)	1.0	(1.2)
(e) % of Net Investment	(2.2)	1.2	(1.4)
(f) % of End Product Sales	(3.7)	2.9	(2.6)
16. TAXES			
(a) Total Taxes as % of Profit in 8(a) (Tax & Profit Before Interest)	-	42	EST 28
(b) Deferred Taxes as a % of Total Tax	76	425	(20)
(c) Total Taxes as % of Profit in 8(b) (Tax & Profit After Interest)	(47)	43	(47)
17. VALUE ADDED PER EMPLOYEE - $1,000	91	86	90
18. CAPACITY			
(a) % Utilitized	74	82	76
(b) Gross Investment per Annual Dollar Capacity Including Intermediates - Dollars	1.23 Revised	2.3	1.38

NOTE: Fixed capital expenditures:
(in constant 1982 dollars)

	1983	1984	1985
Petrochemicals	966	412	161
Fertilizers	204	100	93

NOTES:

1. Gross investment is deemed to be gross fixed assets, plus inventories and plus receivables.
2. Net investment is deemed to be gross fixed assets, less accumulated depreciation, plus inventories, plus receivables.
3. Import totals are those derived from Statistics Canada and cover all imports, whether or not of a class or kind made in Canada.
4. Export totals are based on data reported by participating companies.

* 1982 figures for imports have been determined using a new classification for both the organic and specialty chemicals sector and the petrochemical sector, which has had the effect of decreasing import figures, in turn decreasing Canadian consumption and affecting balance of trade. Previously reported figures have therefore been recalculated to reflect this new product classification and thus enable better comparison.

APPENDIX B-2

DESCRIPTION OF THE INDUSTRY

1. Scope

The Canadian petrochemical industry produces, from approximately five per cent of domestic crude oil and 14 per cent of natural gas consumption, a multitude of compounds and derivatives that are upgraded by many other industries into an array of essential industrial and consumer products, ranging from automotive components and pharmaceuticals to clothing, construction materials, pesticides, paints and cosmetics. (See attached chart depicting flow from petrochemical sources to end-use applications.)

The industry comprises more than 70 manufacturing plants in five provinces. In Alberta, which accounts for 52 per cent of current petrochemical production capacity in Canada, natural gas is the raw material used in the production of ethylene-based petrochemicals, ammonia-based fertilizers and methanol. British Columbia's production capacity is a relatively small 2.6 per cent of the total and, like Alberta, the province is dependent on natural gas for the production of methanol and ammonia-based products. Manitoba's participation, at 1.6 per cent, is limited to natural gas-derived ammonia fertilizers. Ontario, in which is located 35 per cent of total Canadian capacity, depends on crude oil fractions and some LPG's for the manufacture of petrochemical products such as propylene, ethylene derivatives, aromatics and C4's. Ammonia-based fertilizer and explosives production in Ontario is based on natural gas. Quebec, with 9 per cent of total capacity, also depends primarily on crude oil fractions for the production of a broad range of petrochemicals. The Atlantic provinces have the potential for future petrochemical production when indigenous offshore hydrocarbon resources are developed.

Petrochemical sales in 1982 were $5.1 billion and were $5.7 billion the year before; gross fixed assets of the industry are approximately $7.6 billion, an investment which has grown six-fold in the last decade as the industry has striven to compete effectively in domestic and world markets (Table 1).

The industry is one of the most capital-intensive sectors of the economy. In 1982, gross investment was $510,000 per employee. Nevertheless, the industry has created more than 7,200 jobs in the last ten years. In 1982, it directly employed 18,300 people, including a higher than average complement of engineers, scientists, researchers and skilled tradesmen. In addition to the direct employment it creates, the industry helps to generate and sustain thousands of jobs in many upstream supply and support industries and downstream processors.

The petrochemical industry's productivity (value added per employee), at more than $90,000 in 1982 was higher than for any other major manufacturing group with the exception of the petroleum and coal products and almost three times the average for all manufacturing (Table 2). The combination of a large proportion of highly-trained employees and high productivity provides the basis for relatively high remuneration levels. In 1981, average wage and salary payments per petrochemical industry employee were more than in any other manufacturing sector and a third higher than the manufacturing industry average.

2. Interrelationship with other Sectors

The industry's major impact on employment is indirect; it is seen in the high level of construction labour required to build facilities and, more importantly, in the labour-intensive downstream industries which rely on petrochemicals as raw materials.

These include the textile industry, which employs more than 170,000 people and has assets of some $3.4 billion. Petrochemical-based synthetic fibres account for 64 per cent of the industry's annual production of clothing, carpeting, drapes, furniture, and automotive upholstery. The plastics processing industry, employing more than 60,000 people and with assets of $2 billion, produces finished goods from petrochemicals and also is an important link with other industries, supplying such items as thermal insulation, weather-stripping, packaging, lightweight automotive body parts, and components for computers and household appliances.

Similarly, the rubber industry, employing 40,000 people, converts petrochemicals into tires, fan belts, hoses and tubing for manufacturers in other areas of the economy. The forest products, petroleum and mining industries, among others, are improving their efficiency through the use of petrochemical-based processing aids. While petrochemical production is concentrated in three areas of the country, its labour-intensive customer industries are broadly dispersed, spanning the breadth of Canada (Table 3, and Figures 4 & 5).

Another measure of the industry's pivotal role in the economy is the value added to the hydrocarbon resources at each step of the upgrading chain. A recent analysis demonstrated that, when a kilogram of ethylene is attributed a value of one, the value increases to three when the ethylene is upgraded to ethylene oxide, doubles to six at the next stage and triples to nine when converted to textured polyester yarn. By the time the textile is purchased by the consumer as a dress or shirt, the value of the original ethylene has increased by as much as 300 to 700 times.

APPENDIX B-2

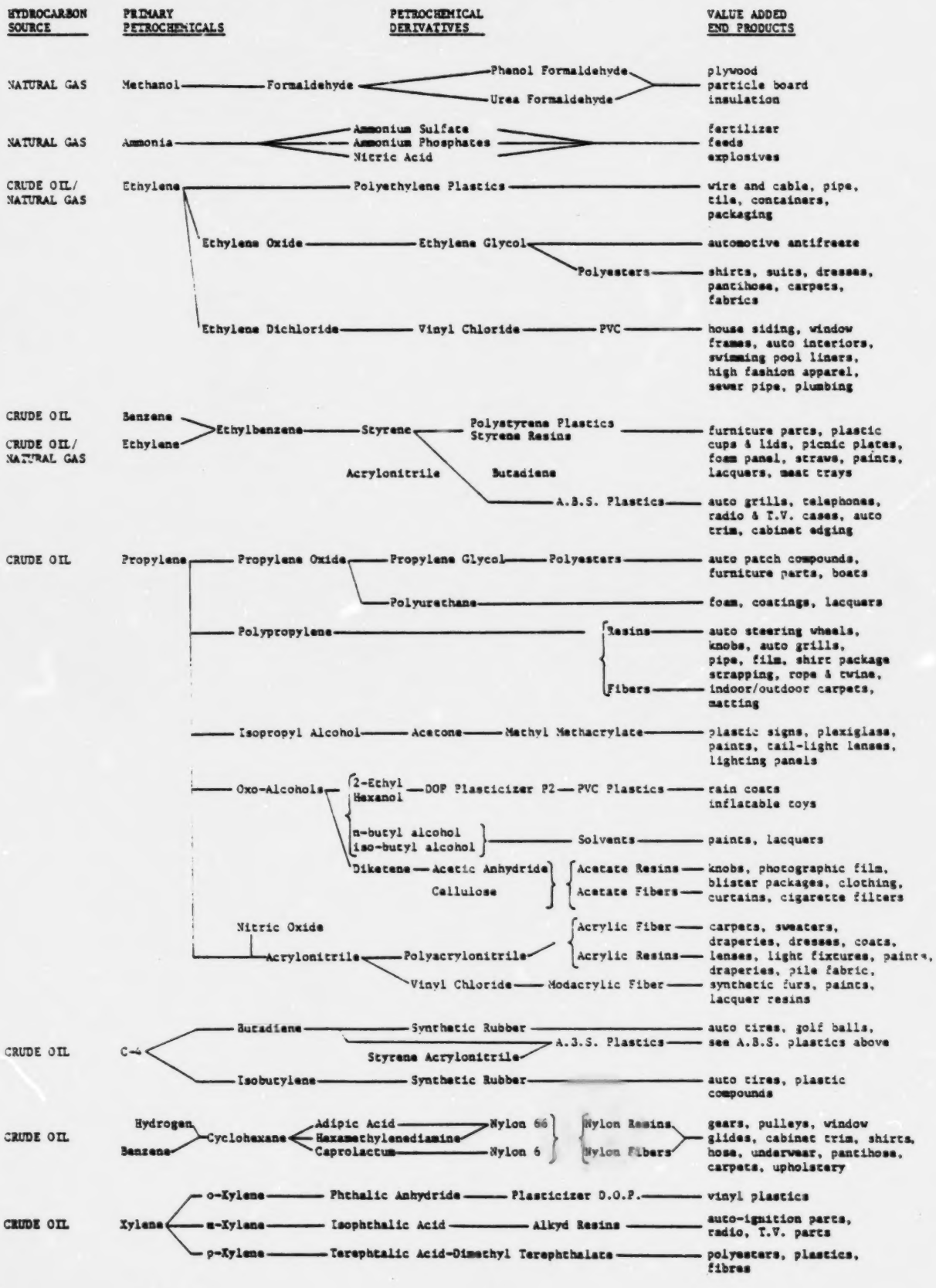
Table 1

PETROCHEMICAL SALES (INCLUDING INTERMEDIATES) AND GROSS FIXED ASSETS

(millions of current dollars)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Sales	641	1,048	1,085	1,309	1,545	2,248	3,447	4,220	5,022	4,434
Including fertilizer (one year data only)										5,145
Assets	923	1,148	1,475	2,001	2,522	2,753	2,925	3,336	4,467	5,942
Including fertilizer (one year data only)										7,677

FLOW CHART - PETROCHEMICAL SOURCES TO END-USE APPLICATIONS



APPENDIX B-2

Table 2

VALUE ADDED PER WORKER, 1981

	1981	1982
Petroleum and coal products	$120,281	
Petrochemicals	118,789	
Petrochemicals including fertilizer		$90,000
Paper and allied products	53,162	
Iron and steel mills	48,652	
Aircraft and parts	43,971	
Manufacturing average	42,221	
Communications equipment	41,766	

Source: CCPA

MAJOR CUSTOMERS[a] OF THE PETROCHEMICAL INDUSTRY

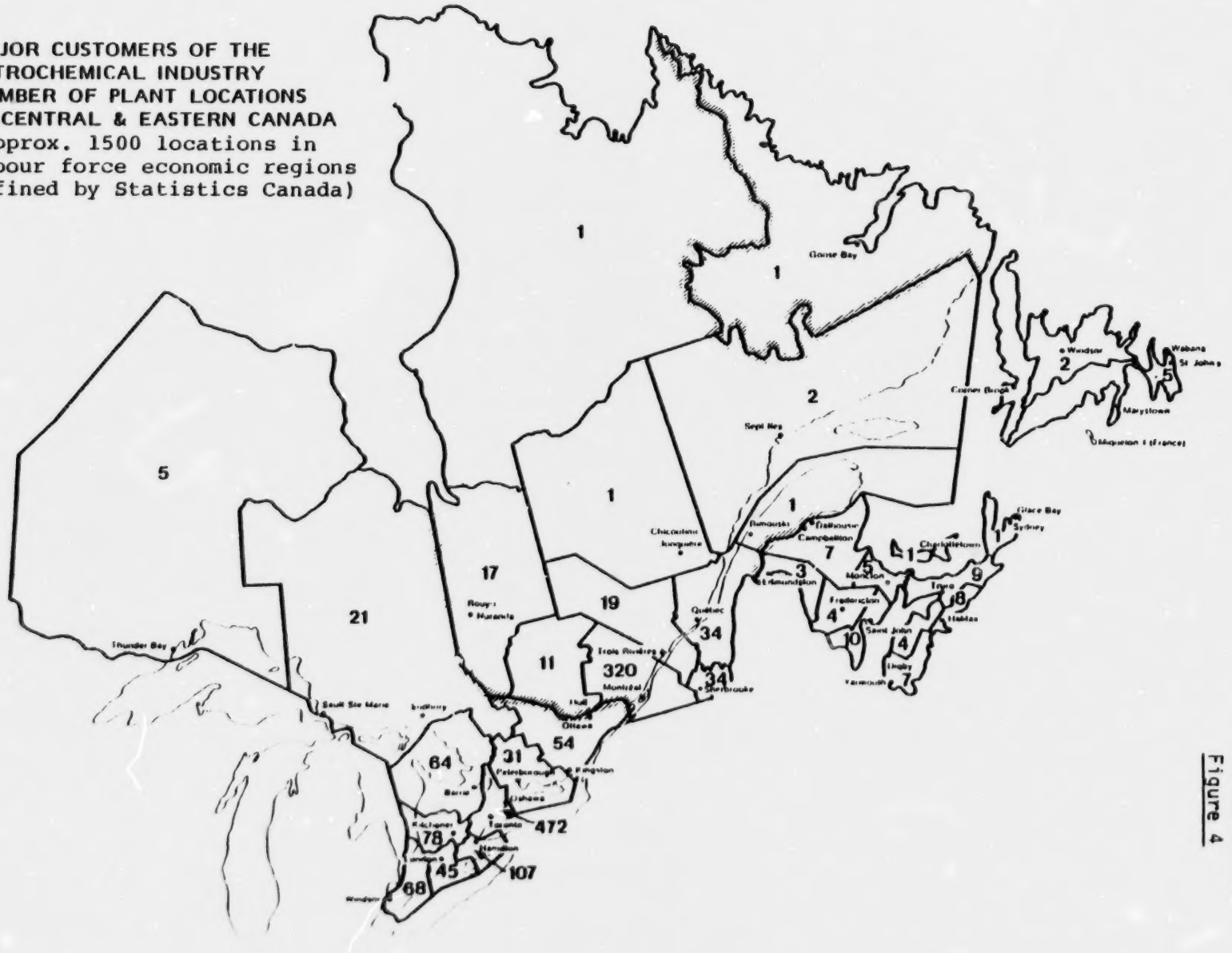
Customer Industries (1)	(1) Share of 1979 Cdn. Petrochemical Output Purchased %	(2) No. of Plants (Excl. Small Businesses)	(3) No. of Employees	(4) Value of petrochemicals req'd to produce $1 million of output	
				Domestically Produced	Totals
Plastic Fabricators	20	419	32,630	$310,000	$527,000
Mfgrs. of Industrial Chemicals	18	153	26,440	345,000 E	587,000 E
Mfgrs. of Plastic & Synthetic Resins	15	52	5,882	345,000 E	587,000 E
Tire & Tube & Other Rubber Industries	8	96	27,239	127,500	229,200
Other Chemical Industries	5	257	15,612	88,900	180,721
Paint & Varnish Manufacturers	5	84	7,195	310,000	527,000
Synthetic Textile Mills	5	79	17,648	149,000	227,368
Paper Box & Bag Manufacturers	3	219	24,574	70,700	119,998
Mfgrs. of Electric Wire & Cable	3	48	9,365	98,000	167,209
Mfgrs. of Soap & Cleansing Compounds	1	61	7,317	310,000 E	527,000 E
Linoleum & Coated Fabrics Industry	1	15	3,114	192,000	325,982
Sporting Goods & Toy Industry	1	112	10,916	67,700	116,702
Miscellaneous Wood Industries	1	117	7,478	73,800	125,232
Motor Vehicle Parts & Accessories	1	215	54,867	10,900	18,537
TOTAL	86	1,927	-	E = Estimates	-

[a] While most industries are linked to one another at some level, major customers are defined as those industries purchasing at least one per cent of total petrochemical output.

(1) selected by using Statistics Canada's Input/Output Model developed for the C.C.P.A.
(2) number of plants and locations were obtained from Statistics Canada's manufacturing reports.
(3) obtained from I/O Model and industry reports - Statistics Canada.
(4) generated by Statistics Canada's Input/Output Model developed for the C.C.P.A.

APPENDIX 8-2

MAJOR CUSTOMERS OF THE PETROCHEMICAL INDUSTRY NUMBER OF PLANT LOCATIONS IN CENTRAL & EASTERN CANADA
(approx. 1500 locations in labour force economic regions defined by Statistics Canada)



Source: Statistics Canada

APPENDIX B-2
Figure 4

MAJOR CUSTOMERS OF THE PETROCHEMICAL INDUSTRY
NUMBER OF PLANT LOCATIONS IN WESTERN CANADA
(approx. 400 locations in labour force economic regions defined by Statistics Canada)

Source: Statistics Canada

APPENDIX 8-2
Figure 5

APPENDIX B-3

PETROCHEMICALS -- A KEY AND RESPONSIBLE INDUSTRY*

As a result of discussions between chemical industry representatives and senior officials of the federal and some provincial governments, a number of criteria have been developed to identify industries that are key and strategic to Canada's economic development. A key and strategic manufacturing industry has been defined as:

1) a dynamic industry, viable in the long term, with potential for market growth and investments that will produce significant and rising levels of employment and incomes for Canadians, as well as potential to be fully competitive in its own and external markets;

2) an integral, pivotal component of the nation's economic structure;

3) a significant, progressive employer;

4) a socially responsible industry;

5) an industry that maximizes the benefit to Canadians derived from the natural and other resources entrusted to it;

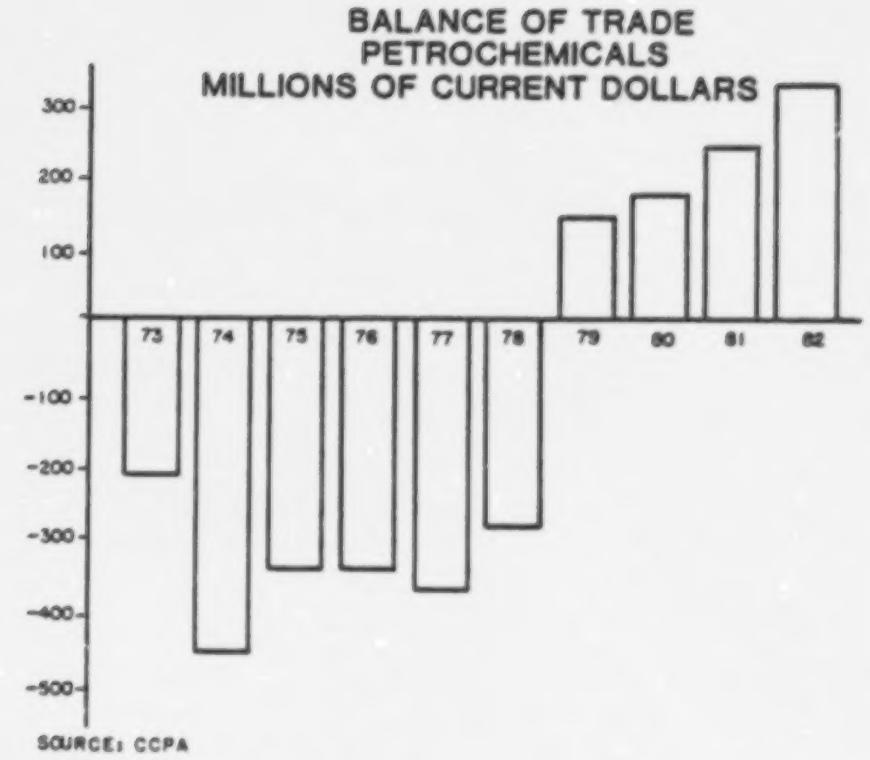
6) and an industry that develops and/or acquires new technology, adapts it to Canadian conditions and utilizes it in all phases of its operations.

What follows is a description of the industry as it measures up to these criteria.

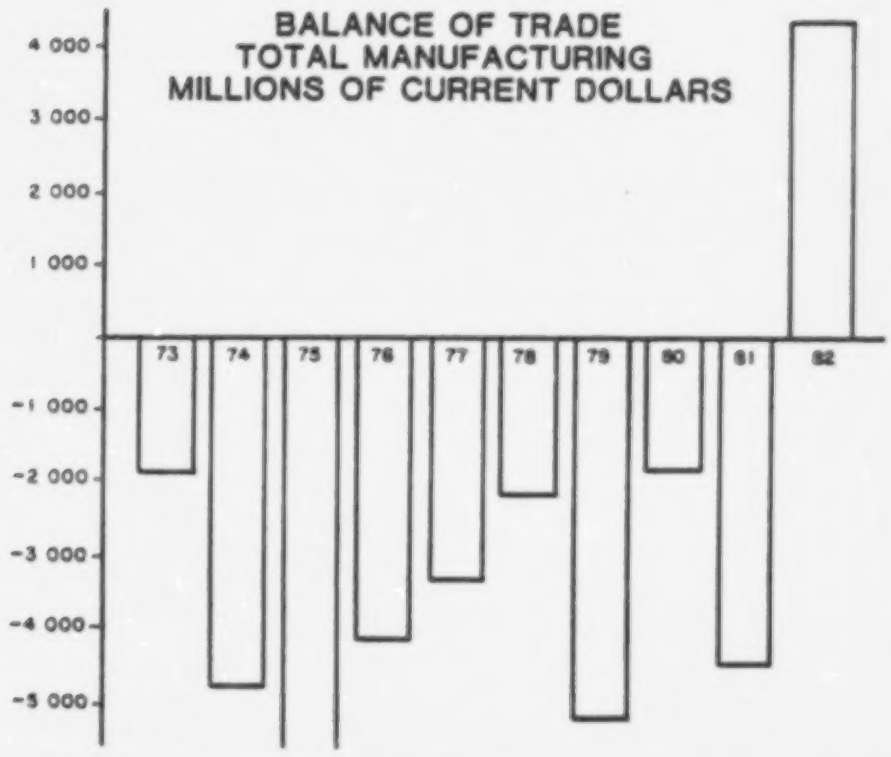
4.1 Dynamic, above-average growth

The petrochemical industry is striving to compete more and more effectively against foreign producers both in Canada and around the world. As a result of this thrust, its record of growth has been outstanding over the last decade, with output increasing at a much faster rate than in most other manufacturing sectors and shipments doubling -- a growth rate twice that of real GNP. As well, the petrochemical trade balance has considerably outpaced the rate of improvement for manufacturing as a whole.

*The data enclosed herein is based on a submission by the Canadian Chemical Producers' Association, which did not include data on the fertilizer segment, because comparable data were not available. Some descriptive sections, however, have been adapted to incorporate direct information on fertilizers. The Task Force believes that this paper truly reflects the situation in the overall petrochemical industry, including ammonia and its derivatives.

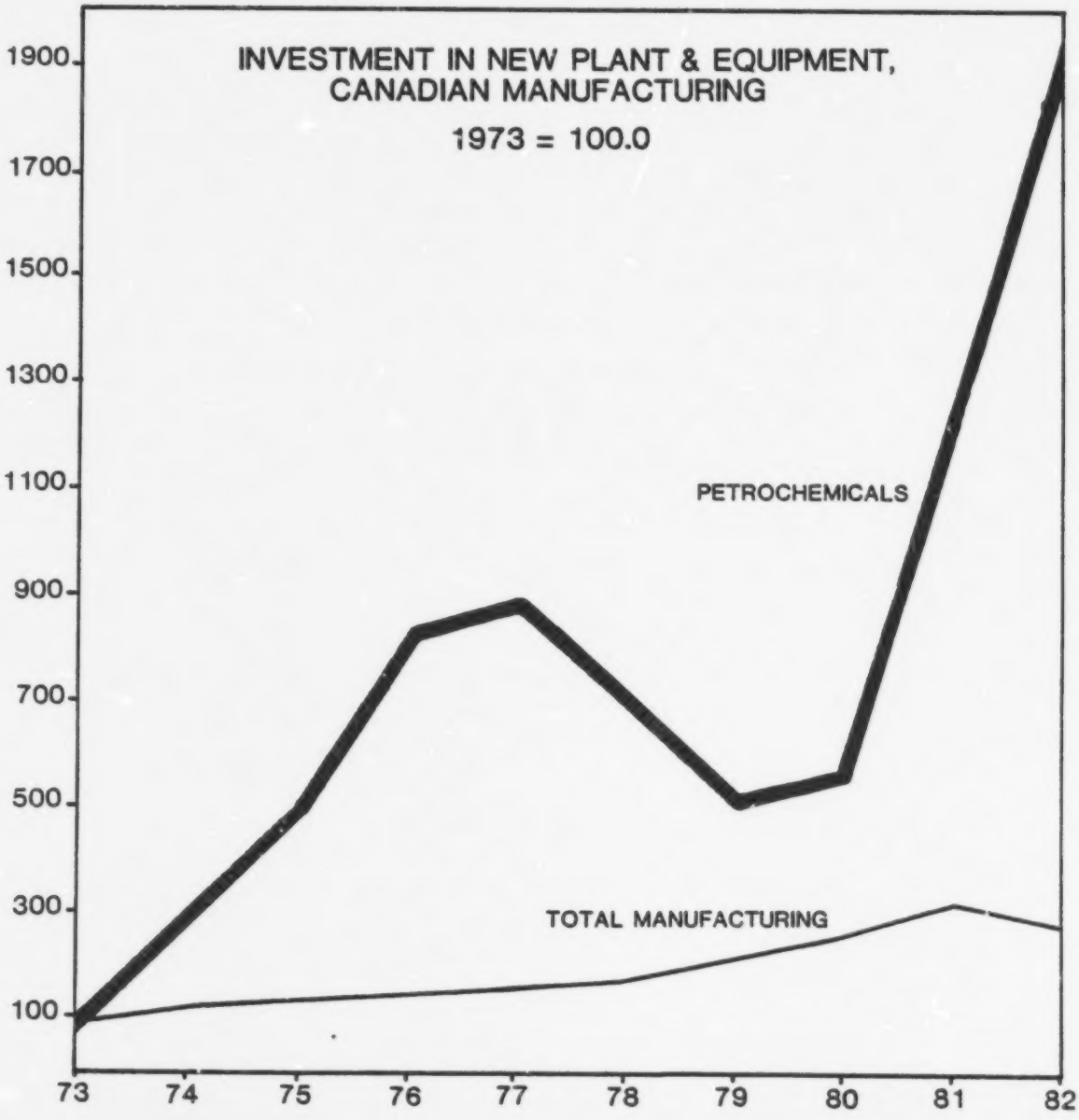


SOURCE: CCPA



SOURCE: INDUSTRY, TRADE & COMMERCE

The industry was able to advance to the point where it could compete against other major petrochemical nations principally because it committed itself to investing in new world-scale plants, beginning in the early 1970's; gross fixed assets increased from $923 million in 1973 to nearly $8 billion in 1982, a much greater investment growth rate than for manufacturing in total.



Source. CCPA STATISTIQUE CANADA

The basis for this major investment program was Canada's favourable resource position relative to virtually all other Western industrialized nations. The petrochemical industry recognized that it was uniquely placed to help Canada to increase its economic strength by upgrading these comparatively abundant hydrocarbon reserves. One 1982 study (BP Statistical Review of World Energy), showed that Canada had 58 years of currently proven natural gas reserves, based on 1982 consumption rates, compared to 11 years in the U.S. and 23 years in Western Europe. For oil, the projections were more than 12 years for Canada as opposed to less than seven years in the U.S. and five years in Western Europe.

Making the most of Canada's proven and potential hydrocarbon resources involves not only extracting them and burning them as fuel but also putting them to wider and longer-lasting use by upgrading them into finished products. Canada should have an edge on the developing, energy-rich nations at the moment because it already has capital facilities, a well-established infrastructure and experienced personnel.

One measure of the industry's economic importance is the amount of value which is added to natural resources at each stage of upgrading. Between 1973 and 1981, the value added, as a proportion of product sales, grew by 86 per cent, compared to 17 per cent for total manufacturing, 13 per cent for primary metals and 11 per cent for paper and allied products.

This has been efficient growth, indicated by the fact that productivity in 1981, as measured by the value added per employee, was three times greater than for manufacturing as a whole and more than twice that for the paper and allied products and primary metals industries.

Whether the chemical industry will be able to fulfil its mandate depends, in part, on its ability to adjust to fluctuating world conditions.

Petrochemical producers worldwide have felt the impact of the recession and responded by restructuring, closing facilities and investing in feedstock flexibility. The Canadian industry has been no exception to this trend and has reacted similarly, although not in the co-ordinated manner of Japanese and European producers. The actions taken by the industry have been designed to capitalize on Canada's intrinsic strengths and take advantage of surplus feedstocks.

Statistics gathered by the Task Force show that a total of 27 production facilities, with a replacement value of more than $900 million, have been permanently closed because they no longer were able to produce petrochemicals competitively. This eliminated capacity of 1,260 kilotonnes, or about 12 per cent of total Canadian capacity. Seventeen of the closures occurred in Ontario, six in Quebec, six in Alberta and one each in British Columbia and the Atlantic Provinces. In addition to these permanent shutdowns, other production facilities valued at $485 million, have been temporarily taken out of service. These plants have a combined capacity exceeding 1,000 kilotonnes.

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
Urea-Formaldehyde Resins		
Almatex	London, Ont.	11.5
Ashland	Mississauga, Ont.	
Benjamin Moore	Toronto, Ont.	
Borden	Laval, P.Q.	11.5
	North Bay, Ont.	11.5
	Edmonton, Alta.	2.5
	Vancouver, B.C.	2.5
C-I-L	Toronto, Ont.	
Cyanamid	St. Jean, P.Q.	
Dural	Dorval, P.Q.	
Fiberglas	Sarnia, Ont.	
Glidden	Toronto, Ont.	
Monsanto	LaSalle, P.Q.	4
PPG	Long Branch, Ont.	
Perkins Adhesives	Valleyfield, P.Q.	
Reichhold	Kamloops, B.C.	2.5
	North Bay, Ont.	7.5
	Port Moody, B.C.	2.5
	Ste. Therese, P.Q.	5
	Thunder Bay, Ont.	11.5
4. AMMONIA		
C-I-L	Courtright, Ont.	373
C-I-L	Courtright, Ont.	380 (start-up 1985)
Canadian Fertilizer	Medicine Hat, Alta.	
	2 plants	720
Cominco	Calgary, Alta.	107
	Carseland, Alta.	360
	Trail, B.C.	65
Cyanamid	Welland, Ont.	221
Esso	Redwater, Alta.	525
Nitrochem	Maitland, Ont.	80
Sherritt Gordon	Fort Sask., Alta.	485
Simplot	Brandon, Man.	100
Western Co-Op	Calgary, Alta.	60
	Medicine Hat, Alta.	60
Ammonia Derivatives		
(a) Primary		
Ammonium Nitrate		
C-I-L	Beloeil, P.Q.	65
	Carseland, Alta.	225
	Courtright, Ont.	145
Cominco	Calgary, Alta.	63
Cyanamid	Welland, Ont.	200
Du Pont	North Bay, Ont.	25

APPENDIX B-5

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
Esso	Redwater, Alta.	210
Nitrochem	Maitland, Ont.	170
Simplot	Brandon, Man.	135
Western Co-Op	Calgary, Alta.	77
	Medicine Hat, Alta.	60
Ammonium Sulphate		
Cominco	Trail, B.C.	200
Sherritt Gordon	Fort Sask., Alta.	125
Urea		
C-I-L	Courtright, Ont.	160
Canadian Fertilizer	Medicine Hat, Alta.	435
Cominco	Calgary, Alta.	70
	Carseland, Alta.	435
Cyanamid	Welland, Ont.	91
Esso	Redwater, Alta.	495
Nitrochem	Maitland, Ont.	45
Sherritt Gordon	Fort Sask., Alta.	402
Simplot	Brandon, Man.	27
Nitric Acid		
C-I-L	Carseland, Alta.	180
	Courtright, Ont.	90
	McMasterville, P.Q.	60
	Nobel, Ont.	16.5
Cominco	Calgary, Alta.	51
Cyanamid	Niagara Falls, Ont.	145
Du Pont	North Bay, Ont.	18
Esso	Redwater, Alta.	150
EXPRO	Valleyfield, P.Q.	40
Nitrochem	Maitland, Ont.	227
Simplot	Brandon, Man.	75
Western Co-Op	Medicine Hat, Alta.	36.5
	Calgary, Alta.	45
Ammonium Phosphates		
Belledune	Belledune, N.B.	272
C-I-L	Courtright, Ont.	170
Cominco	Kimberley, B.C.	175
	Trail, B.C.	160
Esso	Redwater, Alta.	600
IMC	Pt. Maitland, Ont.	50
Sherritt Gordon	Ft. Saskatchewan, Alta.	150
Simplot	Brandon, Man.	145
Western Co-Op	Calgary, Alta.	260
	Medicine Hat, Alta.	181

MAJOR PETROCHEMICAL PRODUCERS AND THEIR PRODUCTS AND PLANT LOCATIONS

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
1. ETHYLENE		
AGE	Joffre, Alta.	545
AGE	Joffre, Alta.	680 (start-up 1984)
Esso	Sarnia, Ont.	220
Pétromont	Montreal and Varennes, P.Q.	295
Petrosar	Sarnia, Ont.	485
Ethylene Derivatives		
(a) Primary		
Polyethylene		
C-I-L	Edmonton, Alta.	73
Dow	Sarnia, Ont.	68
	Sarnia, Ont.	50
	Fort Sask., Alta.	(start-up 1985)
Du Pont	Corunna, Ont.	238
Esso	Sarnia, Ont.	135
Novacor	Joffre, Alta.	270 (start-up 1984)
Union Carbide	Montreal, P.Q.	145
	Moore, Ont.	290
		1269
Ethylene Oxide		
Dow	Fort Sask., Alta.	140
Union Carbide	Montreal, P.Q.	68
Union Carbide	Prentiss, Alta.	182 (start-up 1984)
		390
Ethyl Benzene		
Dow	Sarnia, Ont.	94
Polysar	Sarnia, Ont.	453
Shell	Scotford, Alta.	280 (start-up 1984)
		827
Ethylene Dichloride		
Dow	Fort Sask., Alta.	630
	Sarnia, Ont.	165
Ethyl Alcohol		
Gulf	Varennes, P.Q.	55
(b) Secondary Derivatives		
Ethylene Glycol		
Dow	Fort Sask., Alta.	204
Union Carbide	Montreal, P.Q.	95
Union Carbide	Prentiss, Alta.	227 (start-up 1984)

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
Styrene		
Dow	Sarnia, Ont.	75
Polysar	Sarnia, Ont.	380
Shell	Scotford, Alta.	300 (start-up 1984)
Vinyl Chloride Monomer		
Dow	Fort Sask., Alta.	320
	Sarnia, Ont.	100
Tetra Ethyl Lead		
Du Pont	Maitland, Ont.	15
Ethyl	Sarnia, Ont.	20
(c) Tertiary Derivatives		
Polystyrene		
BASF	Laval, P.Q.	17
Dow	Sarnia, Ont.	98
Monsanto	LaSalle, P.Q.	
Polysar	Cambridge, Ont.	40
	Montreal, P.Q.	36
Potton	Mansonville, P.Q.	16
Styrene Butadiene Rubber (see under Butadiene Derivatives)		
Polyvinyl Chloride		
B.F. Goodrich	Niagara Falls, Ont.	130
	Shawinigan, P.Q.	48
DSAG	Fort Sask., Alta.	100
Esso	Sarnia, Ont.	100
Acrylonitrile Butadiene Styrene (ABS)		
Borg-Warner	Cobourg, Ont.	33
Monsanto	LaSalle, P.Q.	25
Ethoxylated Alcohols		
Alkaril	Mississauga, Ont.	20
Canadian Alcolac	Valleyfield, P.Q.	3
Diamond Shamrock	London, Ont.	2
Domtar	Longford Mills, Ont.	8
Hart	Guelph, Ont.	15
PROPYLENE (chemical grade)		
Esso	Sarnia, Ont.	75
PetroCanada	Trafalgar, Ont.	18
Pétromont	Montreal and Varennes, P.Q.	153
Petrosar	Sarnia, Ont.	318

APPENDIX B-5

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
Propylene Derivatives		
(a) Primary		
Polypropylene		
Hercules	Varennes, P.Q.	68
Shell	Sarnia, Ont.	68
Isopropyl Alcohol		
Shell	Sarnia, Ont.	91
Propylene Oxide		
Dow	Sarnia, Ont.	63
Nonene		
Esso	Sarnia, Ont.	30
PetroCanada	Montreal, P.Q.	8
Dodecene		
Esso	Sarnia, Ont.	58
Cumene		
Gulf	Montreal, P.Q.	38
n-Butyraldehyde		
BASF	Laval, P.Q.	
(b) Secondary Derivatives		
Polyether Polyols		
Dow	Sarnia, Ont.	
Union Carbide	Montreal, P.Q.	
Nonyl Phenol		
CDC	Longford Mills, Ont.	5
2-Ethyl Hexanol		
BASF	Laval, P.Q.	54
Iso Butyl Alcohol		
BASF	Laval, P.Q.	25
Phenol		
Gulf	Montreal, P.Q.	27
Propylene Glycols		
Dow	Sarnia, Ont.	16
Acetone		
Gulf	Montreal, P.Q.	16
Shell	Montreal, P.Q.	23

APPENDIX B-5

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
3. METHANOL		
AGC	Medicine Hat, Alta.	760
Celanese	Edmonton, Alta.	700
Ocelot	Kitimat, B.C.	410
Methanol Derivatives		
(a) Primary		
Formaldehyde		
Bakelite	Belleville, Ont.	19
Borden	Laval, P.Q.	9
	North Bay, Ont.	5
	West Hill, Ont.	7
	Vancouver, B.C.	10
Celanese	Edmonton, Alta.	50
Reichhold	North Bay, Ont.	28
	Port Moody, B.C.	9
	Ste. Therese, P.Q.	8
	Thunder Bay, Ont.	20
(b) Secondary Derivatives		
Phenol-Formaldehyde Resins		
Ashland	Mississauga, Ont.	12
Bakelite	Belleville, Ont.	7
Borden	Laval, P.Q.	3.5
	North Bay, Ont.	3.5
	Edmonton, Alta.	9.5
	Vancouver, B.C.	20
CGE	Toronto, Ont.	0.5
Canadianoxy	Fort Erie, Ont.	7
Cyanamid	St. Jean, P.Q.	2.5
Domtar	LaSalle, P.Q.	3.5
Fiberglas	Sarnia, Ont.	5.5
Lawter	Rexdale, Ont.	0.5
Reichhold	Kamloops, B.C.	11
	North Bay, Ont.	26.5
	Port Moody, B.C.	11
	Ste. Therese, P.Q.	11
	Thunderbay, Ont.	9
Schenectady	Scarborough, Ont.	0.5
Hexamethylene Tetramine		
Bakelite	Belleville, Ont.	
Pentaerythritol		
Celanese	Edmonton, Alta.	25

Modifications have been made to a total of 40 plants, with an overall capacity in excess of 2,630 kilotonnes, to improve technology, lower operating costs, automate processes, increase feedstock flexibility or expand production and storage capacity. Since the industry's total 1982 capacity was less than 10,000 kilotonnes, these modifications have involved more than a quarter of the industry.

Five power plants were also modified to reduce operating costs and hydrocarbon consumption. One such modification alone permitted the replacement of almost 1,000 barrels of oil per day.

To replace older, uncompetitive facilities, eight new plants were constructed with a combined capacity of 2,500 kilotonnes.

4.2 Integral component of Canada's industrial structure

The petrochemical industry is an essential, pivotal component of Canada's industrial structure, maintaining vital interrelationships with other resource development and manufacturing activities and helping to meet the needs of a broad cross-section of the economy.

The industry purchased $2.7 billion worth of commodity raw materials in 1982. Suppliers included the petroleum, coal products, rubber, textile, paper, metal fabricating, machinery, transportation equipment and electrical products industries.

Without the petrochemical industry, many upstream suppliers of products, utilities and services would be greatly changed and a wide variety of downstream processors would be endangered, some probably needing tariffs and government financial support to survive.

The impact on the Canadian consumer would also be direct and dramatic, since petrochemicals are pervasive in the Canadian way of life. Houses, for example, are built with petrochemical-based products like wall and wire insulation, pipe, vapour barriers and coatings and furnished with carpets, drapes and a long list of other items that contain petrochemicals. Similarly, the automobile depends on petrochemicals for tires, hoses, energy-absorbing bumpers and a lot of other components, several of which save on weight and, consequently, fuel consumption.

The petrochemical industry amply qualifies as a "high tech" industry, producing and marketing leading-edge product and process technology for its own use as well as pioneering the application of technology from other industries, such as electronic and computer control of its plants and processes. Petrochemicals help to support such "high tech" industries as aerospace, computers and electronics, which rely on the industry's innovations--lightweight, tough, temperature-resistant plastics, for example, and special high-performance adhesives, sealants, lubricants and coatings.

4.3 Significant, progressive employer

The continuous technological change and development that takes place within the petrochemical industry creates stimulating and rewarding jobs.

Employment in the industry (excluding the significant number of jobs created in downstream industries and in construction industries by petrochemical expansions) increased by 70 per cent between 1973 and 1982, when some 18,000 people were directly employed.

Because of the innovative, technological nature of the industry, the quality of jobs, in terms of interest, challenge, satisfaction and remuneration, is high in comparison with industry generally.

The industry's labour relations record indicates that job satisfaction and morale have been consistently high. Among the major manufacturing groups, the industry loses relatively little time due to labour disputes.

TIME LOST DUE TO LABOUR DISPUTES

	Average days lost per employee per year (1981)
Clothing	.19
Chemicals and chemical products	.26
Rubber and plastics products	.53
Machinery	.70
Electrical products	.82
Textiles	.83
Metal fabricating	1.22
Petroleum and coal products	1.32
Paper and allied products	3.93
Manufacturing average	1.70

(Statistics Canada)

The petrochemical industry is one of the top performers in accident prevention in Canadian industry. The Industrial Accident Prevention Association, which publishes safety figures for Ontario, shows that the chemical and petroleum industries' accident rate has been 60 per cent less than the average for all industry in the 10 years from 1973 to 1982 (Annex I, Appendix B-3); it is generally acknowledged that the petrochemical industry's safety performance is substantially better than even this creditable achievement.

In occupational health, the programs and standards of the petrochemical industry usually precede legislation as well as occupational health initiatives in other industries. Comprehensive programs that meet or exceed federal and provincial legislation have been in place since at least the mid-1970s and, in some parts of the industry, since the late 1960s. Examples of the industry's progressive record in this field would include: provision of high-quality medical consultant services for many years prior to specific medical and occupational health legislation; development of programs dealing with the full range of emotional stresses in and beyond the workplace; and leadership in developing positive employee approaches to fitness, nutrition and lifestyle as part of an all-around health maintenance program.

4.4 A responsible industry

Canadian chemical producers are constantly striving to further the responsible development, manufacture, transportation, storage and ultimate disposal of chemicals to minimize the possibility of adverse effects on human health and well-being and the environment.

All companies represented on the Task Force are committed to:

- ensuring that a company's operations and products do not present an unacceptable level of risk to employees, customers, the public or the environment;

- providing relevant information on the hazards of chemicals to their customers, urging them to use and dispose of products in a safe manner, and making such information available to the public on request;

- making responsible care an early and integral part of the planning process leading to new products, processes or plants;

- increasing the emphasis on the understanding of existing products and their uses and ensuring that a high level of understanding of new products and their potential hazards is achieved prior to commercial development;

- complying with all legal requirements which affect their operations and products;

- being responsible and sensitive to legitimate community concerns;

- working actively with and assisting governments and selected organizations to foster and encourage equitable and attainable standards.

One example of the industry's commitment to the safe handling of chemicals is the Transportation Emergency Assistance Plan (TEAP), which was the first organization of its kind in the world. The current TEAP network involves 10 strategically-located regional

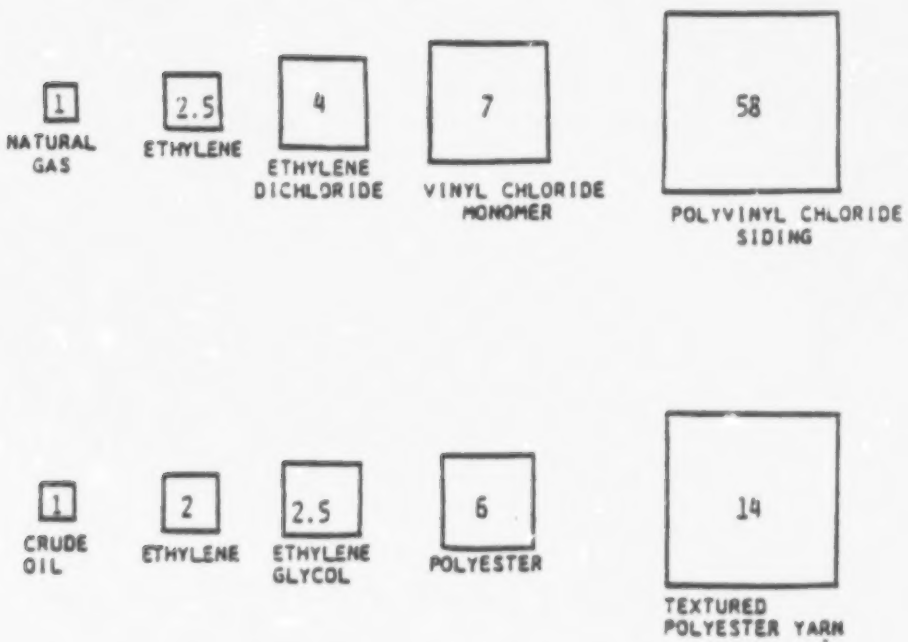
centres along major transport arteries. In an emergency, fully trained and equipped industry specialists are dispatched to provide police, fire and other emergency forces with professional, on-site assistance.

4.5 Maximizes benefits of natural resource use

The petrochemical industry is a prominent and indispensible part of the process that adds value to Canada's natural resources by upgrading them into finished and semi-finished goods. A vast range of essential value-added petrochemical products is manufactured with a high degree of efficiency from only 6.5 per cent of the crude oil and natural gas consumed in Canada.

Petrochemical upgrading is a wise way to use oil and gas: it adds value to basic resources, as illustrated in the following diagram which shows the amount of value added to portions of crude oil and natural gas that have been given a value of one.

CURRENT VALUE ADDED MULTIPLIERS



SOURCE: DOW CHEMICAL CANADA INC.,
UNION CARBIDE CANADA LIMITED

Furthermore, the upgrading process produces essential goods that can be used over and over again, as opposed to the one-time use of hydrocarbons as heating and transportation fuel.

A typical living room, for example, contains about 160 pounds of chemical end-products having roughly the same energy content as a barrel of oil, which the average car consumes in the form of gasoline every 560 miles or so. The approximate energy content of the 250 pounds of chemical end-products found in an average car is one and a half barrels of oil. That amount of oil converted to gasoline would take the car about 850 miles and would be gone forever.

The call for a return to "natural" materials is sometimes heard, but even if this were desirable, the demand for end-products in today's society far exceeds Canada's ability to allocate land to produce natural products like wood and cotton. About 55 million acres would be needed to replace current production of man-made fibres and even replacing the output of an average petrochemical plant would require 600 square miles to grow cotton or an area the size of Nova Scotia to graze sheep. Additionally, natural products like minerals are unable to compete with plastics in such properties as weight and flexibility --critical factors in numerous high-technology applications. In the majority of instances, petrochemical end-products require less energy to make than other natural materials. The following chart illustrates the energy used to produce various products from plastics and alternative materials and takes into account the entire production chain--the energy required to obtain and process the raw materials and fabricate them into end-products.

The chemical industry is a leader in Canada's industrial energy conservation effort and, in 1982, accounted for just under 34 per cent of all industrial energy savings. In 1982, the energy required to produce a pound of product in the chemical industry was on average more than 22 per cent below what was needed in 1972. These gains had been eroded from 25 per cent the year before, due to depressed capacity utilization, but were still well ahead of other major, energy-intensive industries (Annex II, Appendix B-3).

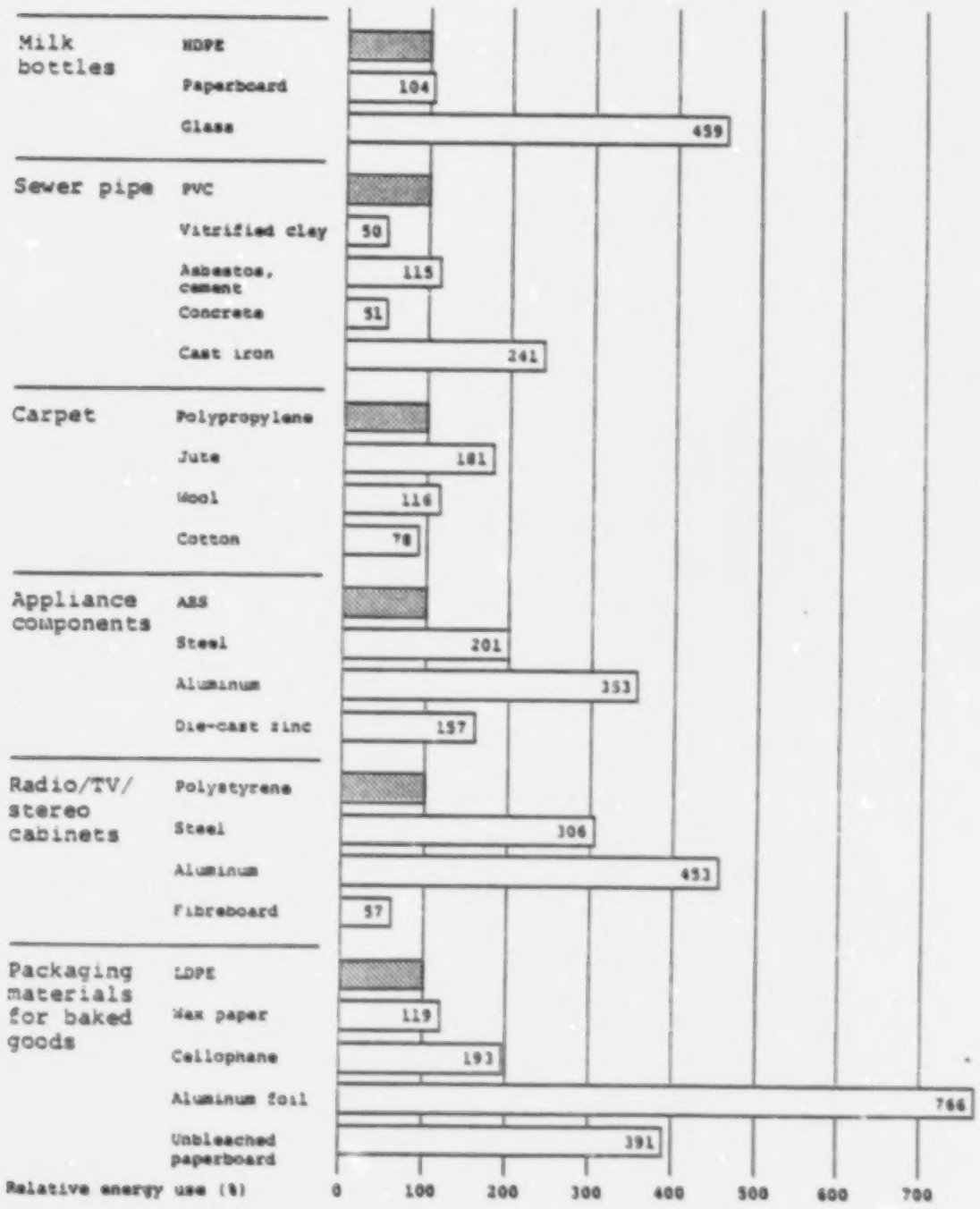
4.6 Develops and acquires new technology

The petrochemical industry's contribution to technological progress in Canada stems from its need to be innovative and technologically advanced by world standards. It enjoys ready access to important global technology and has a well-proven record of applying these developments to Canadian requirements.

Prior to the 1970s the industry's mission was to serve the domestic market, so its ability to absorb new technologies was limited. Today, the increasing international orientation of the industry means it must have access to the best available technologies. Canadian subsidiaries of multinationals have successfully adapted advanced technologies that have been proven elsewhere. Canadian organizations have developed their own areas of specialization and a number of new breakthroughs have been exported.

APPENDIX B-3

Comparative Energy Impacts of Plastic Products and Alternative Materials



Source: "Total Energy Impacts of the Use of Plastic Products in the United States", 1981 study by Franklin Associates Ltd. under contract to Society of Plastic Industries.

Petrochemical innovations have aided a variety of national initiatives. For example, new tire materials and chemical additives have helped to meet mileage standards and additives for unleaded gasolines have contributed to a cleaner environment.

In many other cases, petrochemical research and development responds to Canadian problems and opportunities. Notable examples are low-temperature synthetic lubricants and hydraulic fluids for Far North exploration and wire and cable jacketing compounds to meet specifications that are different from those in the U.S.

A feature of the industry's R&D is that much of it is concentrated on providing technical support to customers and this, in turn, stimulates a high degree of innovation in downstream manufacturing sectors.

Despite the breadth and intensity of this R&D effort, the bulk of funding is internally generated and recourse to government grants and loans is relatively small.

LOST-TIME ACCIDENT RATES - ONTARIO INDUSTRIES

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Chemical & petroleum	2.23	2.68	2.66	2.47	2.77	1.93	2.80	2.59	2.50	2.43
Iron & steel	4.21	4.82	6.04	5.81	5.31	4.67	4.71	4.91	4.58	4.26
Textiles	5.14	6.16	4.83	5.56	4.88	4.93	4.96	5.45	4.38	4.50
Metal manufacturing	6.59	7.06	6.25	6.47	6.37	5.61	6.40	6.25	6.37	5.23
Automotive	4.92	6.31	6.71	7.47	7.98	7.90	8.73	9.57	8.22	9.26
Steel fabrication	10.62	13.54	10.35	10.85	15.03	14.42	12.79	12.84	10.94	9.78
All industries	5.67	6.44	6.26	6.54	6.61	6.02	6.38	6.38	6.27	5.89

Source: Industrial Accident Prevention Association

$$\text{Lost-time accident rate} = \frac{\text{number of accidents} \times 200{,}000}{\text{total hours worked}}$$

ANNEX 1
APPENDIX B-3

ANNEX II
APPENDIX B-3

Energy Conservation in Major Industries,

Avoidance of Energy Use

Source: Canadian Industry Program for Energy Conservation and Energy, Mines and Resources Canada.

APPENDIX B-4

RESPONSIBLE CARE AND GUIDING PRINCIPLES OF THE INDUSTRY

The Canadian petrochemical industry has been actively working to define its policy on Responsible Care. Responsible Care includes the health and safety of the work force, and environmental protection.

All of the members of the Task Force have pledged their commitment to the following statement on Responsible Care.

> Canadian petrochemical producers encourage the responsible development, introduction, manufacture, transportation, storage, handling, distribution, use, and ultimate disposal of chemicals and chemical products so as to minimize adverse effects on human health and well-being ahd on the environment.

Statement of Commitment

The Canadian petrochemical industry is committed to taking every practical precaution to ensure that products do not present an unacceptable level of risk to its employees, customers, the public, or the environment. (A program is actively underway to obtain formal acceptance of these principles by all members of The Canadian Chemical Producers' Association.)

Strategy

The petrochemical industry recognizes that a degree of government regulation is required in combination with the self-initiated actions of industry are required to ensure a sufficiently comprehensive, timely and orderly advance toward the goal of protecting the health and well-being of Canadians and the environment. It supports the development of equitable and attainable standards. Within this framework, industry believes that the best way to achieve this goal is to:

(a) ensure that guidelines and regulations established by government with respect to the potential hazards of chemicals are based on scientifically supported data and/or expert opinion;

(b) ensure that guidelines and regulations are realistic in terms of societal cost/benefit considerations; and

(c) ensure that the justified confidentiality of information, particularly that affecting the competitiveness of companies, is appropriately preserved.

Canadian petrochemical producers are committed to develop and implement plans, programs, and communications within industry and to work in conjunction with governments, regulatory agencies, resource groups, and affected parties to promote the principle of "Responsible Care".

Guiding Principles

The following list of guiding principles is subscribed to by member companies of the Canadian Chemical Producers' Association:

- Ensure that a company's operations and products do not present an unacceptable level of risk to its employees, customers, the public, or the environment.

- Provide relevant information on the hazards of chemicals to customers, urging them to use and dispose of products in a safe manner; and make such information available to the public on request.

- Make responsible care an early and integral part of the planning process leading to new products, processes, or plants.

- Increase the emphasis on the understanding of existing products and their uses to ensure that a high level of understanding of new products and their potential hazards is achieved prior to, and throughout, commercial development.

- Comply with all legal requirements which affect a company's operations and products.

- Be responsible and sensitive to legitimate comm[illegible]ncerns.

- Work actively with and assist governments and selected organizations to foster and encourage equitable and attainable standards.

	Plant Location	Annual Capacities (1983) Thousands of Tonnes	
(b) Secondary Derivatives			
Urea Formaldehyde Resins (see under methanol derivatives)			
5. BUTADIENE			
Pétromont	Montreal and Varennes, P.Q.)	62	
Petrosar	Sarnia, Ont.	125	
Polysar	Sarnia, Ont.	73	
Butadiene Derivatives			
(a) Primary			
Styrene Butadiene Rubber (SBR)			
Polysar	Sarnia, Ont.	150	
Polybutadiene			
Polysar	Sarnia, Ont.	64	
Styrene Butadiene Latex			
Dow	Sarnia, Ont.	10	
Dow	Varennes, P.Q.	10	
Polysar	Sarnia, Ont.	27	
6. BENZENE			
Esso	Sarnia, Ont.	80	
Gulf	Montreal and Varennes, P.Q.)	119	
PetroCanada	Montreal, P.Q.	145	
Petrosar	Sarnia, Ont.	165	
Polysar	Sarnia, Ont.	67	
Shell	Sarnia, Ont.	56	
Shell	Scotford, Alta.	236	(start-up 1984)
Sunchem	Sarnia, Ont.	63	
Texaco	Port Credit, Ont.	18	
Benzene Derivatives			
(a) Primary			
Cyclohexane			
Gulf	Montreal, P.Q.	104	
Ethyl Benzene (see under ethylene derivatives)			
Cumene (see under propylene derivatives)			

APPENDIX B-5

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
(b) Secondary Derivatives		
Adipic Acid		
Du Pont	Maitland, Ont.	120
Hexa Methylene Diamine		
Du Pont	Maitland, Ont.	40
(c) Tertiary Derivatives		
Nylon		
Badische	Arnprior, Ont.	8
Du Pont	Kingston, Ont.	90
7. TOLUENE		
Esso	Ioco, B.C.	38
	Sarnia, Ont.	70
Gulf	Montreal, P.Q.	52
PetroCanada	Montreal East, P.Q.	158
Petrosar	Corunna, Ont.	95
Shell	Corunna, Ont.	53
Sunchem	Sarnia, Ont.	160
Texaco	Pt. Credit, Ont.	20
Toluene Derivatives		
(a) Primary		
Benzene		
Gulf	Montreal East, P.Q.	46
PetroCanada	Montreal East, P.Q.	90
Shell	Corunna, Ontario	11
Trinitrotoluene		
C-I-L	Beloeil, P.Q. Valleyfield, P.Q.	7
8. XYLENES		
Domtar	Hamilton, Ont.	3
Esso	Ioco, B.C.	6
	Sarnia, Ont.	22
PetroCanada	Montreal, P.Q.	175
Shell	Sarnia, Ont.	60
Sunchem	Sarnia, Ont.	170
Texaco	Mississauga, Ont.	12

	Plant Location	Annual Capacities (1983) Thousands of Tonnes
Xylene Derivatives		
(a) **Primary**		
Phthalic Anhydride		
BASF	Cornwall, Ont.	43
9. ACETIC ACID		
Celanese	Edmonton, Alta.	73
Acetic Acid Derivatives		
(a) **Primary**		
Cellulose Acetate		
Celanese	Edmonton, Alta.	30
Acetic Anhydride		
Celanese	Edmonton, Alta.	
Vinyl Acetate		
Celanese	Edmonton, Alta.	50
10. BUTYLENES		
AGE	Red Deer, Alta.	4
Esso	Sarnia, Ont.	14
Petromont	Montreal East, P.Q.	5
	Varennes, P.Q.	36
Petrosar	Sarnia, Ont.	65
Butylenes Derivatives		
(a) **Primary**		
Isobutylene		
Polysar	Sarnia, Ont.	120
Butene-1		
Du Pont	Sarnia, Ont.	10
(b) **Secondary Derivatives**		
Butyl Rubber[1]		
Du Pont	Sarnia, Ont.	120

[1]Includes normal and halogenated

Source: CCPA, Corpus, SRI International

EXAMPLES OF INDUSTRY INITIATIVES TAKEN 1976-1983

NOTE: These data were obtained only from the industry representatives on the Petrochemical Industry Task Force and, therefore, they understate the situation.

Major examinations of heat losses or inefficient energy uses, followed by corrective actions, have resulted in improved energy efficiency of 20%-35% with an average for the industry of about 25% in 1982.

MODIFICATIONS:

Modifications and/or modernization of petrochemical production units or plants have been made for some or all of the following reasons:

- to add improved technology
- to lower production costs
- to improve quality, efficiency, reliability, and safety
- to automate the process
- to increase feedstock flexibility
- to increase the range of products
- to reduce pollution
- to increase operational and/or storage capacity.

Modifications were made to 40 plants, which had an overall capacity in excess of 2,630 kilo tonnes.

The whole petrochemical industrial capacity in 1982 was less than 10,000 kilotonnes, so the modifications listed above covered over 25% of the industry.

CLOSURES:

Plants or production units were permanently shut down when they ceased to be able to provide competitive product quality and price consistent with market needs. Permanent closures were made of 27 such units which had a replacement value of over $900 million. This eliminated capacity of 1,250 kilotonnes equivalent to over 12% of the total Canadian capacity. Of these plant closures, 17 were in Ontario, six in Quebec, six in Alberta, one in British Columbia and one in the Maritime Provinces.

In addition to the permanent closures, four other units valued at $185 million were shut down on a temporary basis. These plants, with capacity exceeding 1,000 kilotonnes, are still closed.

These closures resulted in the complete elimination of six products from the list of chemicals made in Canada.

NEW UNITS TO REPLACE OBSOLETE UNITS:

During the period 1976-1983, eight new production units or plants were constructed to replace the older, less competitive units. These new units had a combined capacity of 2,500 kilotonnes.

OTHER:

1. New or modified facilities were built to make it possible to ship in ocean tankers, and interplant pipelines were added to maximize the utilization of feedstocks, tankage, shipping facilities, etc.

2. Modifications were made at five power plants to increase capacity as well as providing flexibility to use alternative fuels both for the saving of oil and dollars. One such modification resulted in the replacement of almost 1,000 barrels of oil per day.

APPENDIX C

ENERGY RESERVES IN CANADA, THE U.S., AND WESTERN EUROPE

APPROXIMATE YEARS OF ENERGY RESERVES IN MAJOR WESTERN INDUSTRIALIZED AREAS

	1983 Oil Consumption (KM tonnes)	Proven Reserves (KM tonnes)	Approximate Years of Oil Reserves Left	1982 Gas Consumption (KM tonnes)	1982 Gas Reserves (KM tonnes)	Approximate Years of Gas Reserves Left
Canada	.073	0.9	12.3	.043	2.5	58.1
United States	.703	4.7	6.7	.463	5.3	11.4
Western Europe	.6011	3.2	5.3	.1743	4.1	23.5

Source: BP Statistical Review of World Energy, 1982. The British Petroleum Company.

APPENDIX C

APPENDIX D

INTERNATIONAL ENVIRONMENT

APPENDIX D-1

INCENTIVES OFFERED BY DEVELOPING OIL AND GAS RICH NATIONS

(a) Saudi Arabia

(b) Mexico

(c) Indonesia

SAUDI ARABIA PETROCHEMICAL INDUSTRY

FACTOR	RESPONSE	EXPLANATION
Level of National Planning for Petrochemical Industry	High	The Saudi Government considers the petrochemiccal industry as an opportunity to exploit an abundant supply of natural gas and up-grade it into 1st and 2nd stage derivatives for the export market. Projects are done on a joint venture basis with Saudi Basic Industries Corporation (SABIC) which is owned by the Saudi Government. At the basic olefins level the ventures are 50% SABIC and 50% foreign partner. A crude oil entitlement of 500 barrels per day is allowed for each $1 million invested in equity by the foreign partner. This is of no value in times of excess supply. Some discount from this price appears to be extended to Saudi refiners in times of unstable oil pricing. Entitlements are offered at world price.
Fuel & Feedstock Costs		
Crude	World Price	
Natural Gas	10% of World Oil Price (BTU basis)	The ventures have a minimum target return of 25% on equity feedstock and fuel is transferred to the venture at this price until the target return is reached at which time feedstock cost can be raised.
Naphtha & Ethane	Costs Not Available	
Labour Costs	Equal to U.S.A. for Nationals. When Large Contingent of Expatriates are included a Factor of 1.75 Applies.	Labour costs are lower per man hour but this is offset by lower productivity.
Plant Construction Costs		
Capital	1.8 Times Higher Than U.S.G.C.	Ethylene plant alone can be built at 1.3 of U.S.G.C., however, when housing, roads, rails, terminalling, and docks are included costs escalate rapidly.
Grants	None	
CCA & Depreciation		Depreciation is based on a 15 year straight-line basis for tax purposes.
Taxation		There is a 5 year exemption from all Saudi taxes.
Debt Financing	Projects done on a 70/30 Debt Equity Ratio	On the 70% debt 60% is borrowed from the Government at 3% interest which escalates to 6% when the venture achieves a pre-tax return on equity of 20%. The remaining 10% of debt is borrowed at conventional rates.
Logistics Costs	Virtually all Exported	Jubail to Rotterdam and Gulf Coast $40/tonne. Jubail to Japan $35/tonne. Easy access to main global trade shipping routes.
Import Restrictions	Low, Little Domestic Market	
Domestic Market		
GNP (1980)	$170 billion Cdn	
Population (1980)	8.6 Million	
Per Capita Plastics Consumption	8 Kg	

MEXICAN PETROCHEMICAL INDUSTRY

FACTOR	RESPONSE	EXPLANATION
Level of National Planning for Petrochemical Industry	High	Tax incentives provided since 1979 for industry to invest, create jobs and buy Mexican equipment particularly if located in less developed areas. Results to date only fair as promised ports and infrastructure not provided and also tax benefits reduced by economy downturn. Plan now being revised.
Feedstock & Fuel Costs		
Crude Oil	35% of World Oil Price	Estimated from PEMEX prices of primary derivatives.
Natural Gas	5% of World Oil Price	Further 30% discount available, including raw materials and energy from PEMEX, conditional on priority location and 25% export level. Forecast 1983 @ US 26¢ per million BTU.
Naphtha		PEMEX internal transfer and price not known.
Ethane		PEMEX international transfer and price not known.
Labour Costs	25% of U.S.	Range is 15-30% with fringe benefits costing 40% of base rate.
Plant Construction Costs		
Capital	65% of U.S.G.C.	Range is 55-75% with 150 pesos = $1 U.S. and 85% inflation rate. Government maintaining competitiveness by offsetting high inflation with periodic peso devaluation.
Grants		Purchase of design, engineering and technology construction of industry infrastructure.
CCA		Legislated at 9% straight line, but negotiable provided special permits are obtained.
Taxation	42% Corporate Rate +21%, if foreign controlled	Investment Tax Credit (CEPROFIS) ranges from 10% to 25% of fixed investment depending on the zone. Tax Credit amounting to 20% of employees wages generated by new investment. Additional 5% tax credit if local equipment purchased. Import duty exemption of up to 80% can be earned by increasing exports relative to the value of imported equipment.
Debt Financing	Preferential Rates	Financial Development Fund (FONEI) provides preferential rates for expansion or export financing for peso working capital requirements. Hard currency receivables can be discounted at 6 to 8%. Repayment of principal and interest on dollar debt can be made at preferential rates.
Logistics Costs		
% of production		
Consumed domestically	90%	Average domestic freight - $35/tonne (3 pesos/tonne/km).
% Exported	10%	Target 25%, but so far mainly ammonia is exported.
Import Restrictions		
Tariffs	High	Mexico protects priority industries from import competition through tariffs at 50% or more. Duty on not made items moderate by PEMEX imports Duty Free.
Quotas	Low	
Non-Tariff Barriers	Low	
Domestic Market		
GNP (1980)	$216 billion Cdn	
Population (1980)	69 million	
Per Capital Plastics Consumption	9 Kg	

APPENDIX D-1 (b)

INDONESIAN PETROCHEMICAL INDUSTRY

FACTOR	RESPONSE	EXPLANATION
Industrial Strategy	Yes	Indonesia has a domestic ammonia and methanol industry but no other domestically produced basic petrochemicals. The government is attempting to develop a local industry based on ethane cracking to produce petrochemicals for the domestic market. There are no plans to develop a crude-based petrochemical industry.
Fuel & Feedstock Costs Crude	Pricing not developed for petrochemical end use	The refining industry in Indonesia is state-owned. Refined products (domestic production or imports) are sold domestically at approximately 25% of world price. We assume, therefore, crude transfer price to the refinery is approximately 25% of world price. There is no crude used in petrochemical production.
Natural Gas	As low as 5% of world price	The domestic price of natural gas varies from $.24 to $1.97 U.S. per MMBTU for energy and present petrochemical end uses (methanol, ammonia). New petrochemical complexes are expected to be built on outlying islands and the feedstock price has not been negotiated.
Naphtha	Pricing not developed for petrochemical end use	
Labour Costs	20% to U.S.	Labour rates are low with fringe benefits costing 30 - 50% of base salary.
Plant Construction Cost Capital Cost	2.2 times U.S.G.C.	The capital cost factor is lower for the island of Java; however, new petrochemical complexes must be built on the outer islands in areas that are not well developed.
CCA & Depreciation		Depreciation is straight line over 10 years. Investment allowance is above depreciation at 25% for one year in any of first 4 years commencing in year of investment.
Taxation	Tax holiday for 4 to 5 years 40% corporate tax rate	Tax holiday of 2 to 6 years is negotiable depending on desirability of industry, size of investment and number of people employed. Corporate tax rate of 45% on profit over $800 000 U.S. is reduced to 40% by use of outside auditors.
Debt Financing	No special arrangements	Investment tax credit of 20% if share capital is 20% owned by Indonesia.
Logistics Cost % of production Consumed domestically	Estimated at 50%	
% exported	Estimated at 50%	
Import Restrictions Tariffs	Highest rate allowed under GATT + import tax of 5%	Unless no domestic production and product is required.
Quotas	Yes	Government restricts imports when they wish to promote domestic production.
Non-Tariff Barriers	High	Letter of credit for value of import plus 100% must be established in Indonesia. Duty is payable in advance of shipment.

INDONESIAN PETROCHEMICAL INDUSTRY

FACTOR	RESPONSE	EXPLANATION
Domestic Market		
GNP (1980)	$70 billion Cdn	
Population (1980)	144 million	
Per Capital Plastics Consumption	1.9 Kg	

- 2 -

APPENDIX D-2

WESTERN EUROPEAN ETHYLENE CAPACITY
('000 tonnes/year)

Country	Early 1981	End 1981	Mid-1983
Austria	370	300	250
Belgium	535	535	525
Finland	185	185	185
France	2,890	2,770	2,490
West Germany	4,685	4,085	3,560
Italy	1,470	1,310	1,750
The Netherlands	2,725	2,585	2,240
Norway	300	300	300
Portugal	300	300	300
Spain	1,080	1,030	955
Sweden	365	365	365
Switzerland	25	25	25
UK	2,260	1,960	1,450
TOTAL	17,190	15,750	14,395

ETHYLENE

EVOLVING SUPPLY/DEMAND SITUATION

(M Tonnes)

		SUPPLY			DEMAND
		Capacity	Production**		
CANADA	1982	1.6	1.0		1.2
	1985	2.2*	1.7		1.6*
	1990	2.6*	2.3	exporter	2.2*
U.S.A.	1982	17.7*	11.4		12.5*
	1985	17.0*	14.6		13.6*
	1990	16.9*	14.4	importer	15.5*
EEC	1982	15.4*	10.6		10.6*
	1985	13.8*	11.9		11.6*
	1990	13.6*	11.3	importer	12.3*
JAPAN	1982	5.5*	3.6		3.6*
	1985	4.5*	2.7		3.8*
	1990	4.3*	2.9	importer	4.1*
S. AMERICA	1982	1.4	1.1		1.1
	1985	2.2	1.6		1.5
	1990	3.1	2.8	exporter	2.7
OTHER	1982	6.9	6.3		4.8
	1985	9.4	8.5		8.3
	1990	11.2	10.1	exporter	8.6
			CAPACITY UTILIZATION		
WORLD	1982	48.5*	34.0	(70%)	33.8*
	1985	49.1*	41.0	(84%)	39.8*
	1990	51.7*	46.5	(90%)	45.4*

* Average from Task Force Survey ** Production determines shifting trade patterns.

METHANOL AND AMMONIA

EVOLVING SUPPLY/DEMAND SITUATION

(M Tonnes)

		METHANOL*		AMMONIA (FERTILIZER YEAR)	
		Capacity	Demand	Capacity	Demand
N. AMERICA	1982	7.2	3.5	20.9	17.1
	1985	8.2	4.4	18.3	17.4
	1990	9.0	6.1	18.1	20.4
S. AMERICA	1982	0.2	0.2	5.5	3.8
	1985	0.2	0.2	7.1	4.5
	1990	0.4	0.4	8.5	5.9
EEC	1982	3.0	3.3	18.6	14.9
	1985	3.1	3.7	19.1	16.1
	1990	3.1	4.6	20.1	18.4
MIDEAST/ AFRICA	1982	0.5	0.06	3.8	3.5
	1985	2.4	0.2	5.7	4.5
	1990	2.8	0.5	9.5	6.0
ASIA/PACIFIC	1982	1.0	1.6	35.5	28.3
	1985	4.0	1.8	38.5	31.7
	1990	4.0	2.3	46.2	38.1
EAST EUROPE	1982	2.3	2.9	33.9	18.4
	1985	4.7	3.3	41.6	21.0
	1990	4.7	4.1	47.9	25.2
WORLD	1982	14.1	11.5	118.2	86.0
	1985	22.6	13.6	130.3	95.2
	1990	24.0	18.0	150.3	114.0

* The degree of overcapacity depends on the level of its use directly as a fuel or as an octane enhancer. Demand numbers represent chemical uses only.

APPENDIX E

REPORT OF THE TRANSPORTATION SUBCOMMITTEE

APPENDIX E

PETROCHEMICAL INDUSTRY TASK FORCE (EXECUTIVE SUMMARY - TRANSPORTATION)

Transportation costs rank second only to raw material costs (feedstocks and energy) in determining the cost of manufacture of Canadian petrochemicals. The total cost of transportation (freight, equipment and infrastructure) is in excess of 10% of the value of the petrochemical output.

In the absence of major petrochemical production facilities on tide-water, and the absence of year-round Great Lakes shipping capabilities, the demand for transportation by the Canadian petrochemical industry is characterized by relatively long overland distances to attain sufficient market volume. The industry, therefore, is heavily dependent upon both rail and truck modes for these overland volume movements. It is a competitive reality for Canadian petrochemical producers that they ship longer distances to both domestic and foreign markets and have less flexibility in the choice of shipment modes when compared to U.S. producers.

Because of this dependence on the transport system and because transportation has such a significant impact on competitiveness and profitability the Canadian petrochemical industry has a vital and strategic concern for any developments which could impact the transportation sector in Canada.

The transportation concerns which confront industry and government today can be grouped into three broad areas:

1. The Transport System
2. The Regulation of the Transportation of Dangerous Goods
3. The Competitive Environment in the Transportation Industry

1. The Transport System

The passage of legislation resolving the impact of the Crow Rate on the financial well-being of the railways is to be commended. The railways can now focus their efforts on the expansion and upgrading of rail services to the West Coast. The petrochemical industry in turn can now be assured of long-term access to a safe, reliable and economic transport system to Western Canadian ports and strategic Pacific Rim markets.

Future expansion of the petrochemical industry in Alberta and British Columbia may necessitate the re-consideration of a major terminal facility on the West Coast.

2. The Regulation of the Transportation of Dangerous Goods

The petrochemical industry has always taken a responsible leadership position on emergency response and preventative measures to ensure that dangerous goods are transported safely.

The Grange Commission Report influenced the framework for future regulatory change on the transportation of dangerous goods in Canada. Industry and government have consulted constructively throughput the development of these new regulations. As the implemention process continues, both parties should continue this constructive dialogue in the best long-term interest of the Canadian public.

The major challenges in the regulatory area continue to be maintenance of short-term regulatory reciprocity and long-term uniformity with the United States regarding the cross border transport of dangerous goods. In fact, uniformity of regulations across political boundaries of every description, national, provincial and municipal is critical to the petrochemical transport system.

3. The Competitive Environment in Transportation

The Canadian petrochemical industry is more and more dependent upon access to global markets. This growing dependence dictates that in order to ensure competitive access to these markets, the Canadian transportation system must be responsive to changes in both continental and global transportation systems.

The Stagger's Rail Act and the Motor Carrier Act have changed the United States transportation industry through dynamic regulatory reform. The basic thrust has been to increase competition within both the rail and truck modes. A similar thrust is needed in Canada.

The current review of interswitching limits provides an extraordinary opportunity for a dramatic increase in intra-modal rail competition. Similarly, the review of entry requirements for truck common carriage in almost every province provides the framework for the stimulus of competition within the truck mode. There is no question that the competitive process can be expanded by affirmative action in both of these above areas. It is also appropriate to review, with the view of discontinuing, the practice of collective rate making in the areas where constructive competition can be fostered and productivity improvements generated by setting prices independently.

In the more competitive environment envisioned from the above changes both industry and government will need to critically review the merits of allowing confidential rate and service agreements in Canada, and the possible advantages and disadvantages to all shippers and carriers.

The environment is appropriate to re-evaluate traditional approaches to transportation regulations in Canada. Several studies are currently under way by government to determine the climate and appropriateness for regulatory reform of the Canadian transportation industry. Petrochemical producers, individually and through their associations will develop and present positions regarding these major transportation issues. A close dialogue with the Canadian Transport Commission, Transport Canada, Consumer and Corporate Affairs, Provincial Governments, carriers and other industry associations will be essential in order to develop realistic recommendations to improve competitiveness and ensure the long-term health of both the petrochemical and transportation industries.

POOR
QUALITY
ORIGINAL